

The Political Economy of "Natural" Disasters

Author(s): Charles Cohen and Eric D. Werker

Source: *The Journal of Conflict Resolution*, Vol. 52, No. 6 (Dec., 2008), pp. 795-819

Published by: Sage Publications, Inc.

Stable URL: <http://www.jstor.org/stable/27638641>

Accessed: 11-08-2015 18:32 UTC

Your use of the JSTOR archive indicates your acceptance of the Terms & Conditions of Use, available at <http://www.jstor.org/page/info/about/policies/terms.jsp>

JSTOR is a not-for-profit service that helps scholars, researchers, and students discover, use, and build upon a wide range of content in a trusted digital archive. We use information technology and tools to increase productivity and facilitate new forms of scholarship. For more information about JSTOR, please contact support@jstor.org.



Sage Publications, Inc. is collaborating with JSTOR to digitize, preserve and extend access to *The Journal of Conflict Resolution*.

<http://www.jstor.org>

The Political Economy of “Natural” Disasters

Charles Cohen

Vice President

Sankaty Advisors

Eric D. Werker

Harvard Business School

Harvard University

Natural disasters occur in a political space. Although events beyond our control may trigger a disaster, the level of government preparedness and response greatly determines the extent of suffering incurred by the affected population. The authors use a political-economy model of disaster prevention, supported by case studies and preliminary empirics, to explain why some governments prepare well for disasters and others do not. The authors show how the presence of international aid distorts this choice and increases the chance that governments will underinvest. Policy suggestions that may alleviate this problem are discussed.

Keywords: *natural disasters; humanitarian aid; Samaritan's dilemma*

Natural disasters occur in a political space. They are not driven by politics, nor are they immune from politics. Incentives faced by human actors can affect the prevention, mitigation, and damage of natural disasters, even if they cannot affect the likelihood of rainfall in a specific area or seismic activity along a particular fault line. This is hardly controversial. The vast literature on disaster prevention and response has appreciated the political dimension of disasters for decades (Olson 2000; Platt 1999; Blaikie et al. 1994; Albala-Bertrand 1993; Bommer 1985; Cuny 1983; Davis and Seitz 1982; Diggins, Wright, and Rossi 1979; Abney and Hill 1966). There is empirical evidence of the relationship: in the United States,

Authors' Note: We are grateful to the Mellon-MIT Inter-University Program on Non-Governmental Organizations and Forced Migration for funding. Our NGO partners, the Refugee Law Project in Kampala, Uganda, and the Refugee Consortium of Kenya in Nairobi were particularly helpful. We thank the dozens of humanitarian workers and policy makers in Nairobi, Kampala, Lokichoggio, and Bundibugyo who gave us their time, hospitality, and understanding. Comments from Jim Alt, Sarah Anderson, Andreea Balan, Dawn Brancati, Ethan Bueno de Mesquita, Mihir Desai, Edward Glaeser, Karen Jacobsen, Michael Kremer, Julio Rotemberg, Sharon Stanton Russell, and seminar participants at Harvard Government and Economics departments, Harvard Business School, and MIT were invaluable. An appendix with proof of propositions, as well as data and do-files for replicating tables, can be found at <http://jcr.sagepub.com>.

political considerations may explain half of all federal disaster relief (Garrett and Sobel 2003), and electoral factors influence whether a president issues a disaster declaration (Downton and Pielke 2001; Reeves 2005); around the world, disasters tend to be more severe in poorer countries that are poorly run (Strömberg 2007; Kahn 2005).

This article represents the first attempt to synthesize these observations into a formal model of disaster mitigation that contains empirical predictions on the severity of disasters. In addition, this article is the first to systematically incorporate the political aspect of disaster in the heart of the model and to recognize the feedback between policy interventions and the seriousness of the disasters themselves. By bringing free relief to countries afflicted by so-called natural disasters, international humanitarians can create problems of moral hazard with a time-inconsistency nature. In the event of a government's being ill prepared for a disaster, international relief effectively rewards bad behavior on the part of the poor countries' governments.

We adopt a precise, mathematical definition of disaster when the model is introduced in the section of this article titled "A Political Model of Disasters."¹ Our definition is in spirit with Erikson (1976): "[Disasters] involve considerable harm to the physical and social environment; they happen suddenly or are socially defined as having reached one or more acute stages; and something can be done to mitigate their effects before or after they happen" (quoted in Kreps 1998, 33). In other words, disasters involve a stochastic negative shock, the severity of which can be affected through a process of prevention and relief. It is precisely that process that we model. Henceforth, *shock* refers to the natural act itself—the volcanic eruption, earthquake, drought, and so on—and *disaster* refers to the net impact of the shock on the population.

Natural disasters have killed more than sixty-two million people worldwide since 1900 (OFDA/CRED 2003). This is approximately the same number as all those killed in both World Wars,² yet scarce attention has been paid to natural disasters in the economics and political science literature, while dozens of articles on conflict are published each year. More than 85 percent of the deaths occurred between 1900 and 1950, and a little more than one million deaths from natural disasters have occurred since 1990.³ Certainly, part of the credit for the relatively small number of disaster deaths during the past decade is because of the efforts of the global humanitarian community and its ever-increasing resources and effectiveness. In the month of October 2005 alone, international humanitarians and national Red Cross chapters responded to natural disasters in the Central African Republic, Costa Rica, El Salvador, Guatemala, India, Indonesia, Mexico, Nicaragua, Pakistan, Paraguay, Romania, and the Sudan (Reliefweb 2005).

In this article, we take as given that the relevant actors work in a political space, and we model that space using a reduced-form framework. National governments care about the social welfare of their citizens but also want to maximize government income. These governments can spend on both preventive and palliative measures

to lessen the impact of a potential natural shock. International humanitarian organizations can step in with ex-post relief to poor countries that experience natural disasters. This setup produces a number of important results, some of which have been independently noted in different strands of the literature.

The model predicts that rich governments and governments that care about social welfare spend more on disaster prevention and mitigation. Governments can use natural disasters to redistribute power through the political effect, favoring disaster spending in regions that are politically aligned with the party in power. Governments are less prone than local populations to "insure" against disasters through preventive measures, because a regional shock has less impact on the national government's income than on that of the local region.

The addition of humanitarian aid to the model produces a bailout effect: governments underinvest in disaster prevention when they know that they will be bailed out in the event of disaster. This effect is mitigated for pariah states, which may not have access to international aid. In the extreme, we can witness a racket effect, in which governments can deliberately neglect a population so as to attract—and steal—humanitarian aid in the event of a disaster. Governments without other sources of external income are more likely to be influenced by the racket effect. In addition, in the case of shocks that decimate local populations, international organizations will tolerate higher levels of theft to deliver urgently needed aid. This can lead to a desperation effect: in dire circumstances, rapacious governments have a stronger ability to increase their level of theft.

These results have policy implications for reducing the severity of natural disasters. First, the international humanitarian community must be involved in disaster prevention if it is to offer free relief. Second, whenever possible, disaster relief should be provided locally so as to reduce the significance of the racket and political effects on the central government. Third, political development, in the form of more responsive governments and less intrastate conflict, will reduce the severity of disasters. Fourth, in particularly problematic areas, governments can be given extra payments for proper disaster preparation, including establishing and enforcing efficient regulations.

This article is related to two large bodies of research in political science: political economy of war and foreign aid. In essence, disasters can be used as a blunt policy instrument to target or reward populations and to enrich a government, and they can be mitigated with outside effort. Corollary works on the political economy of war include investigations into why the state might target its own population (Valentino, Huth, and Balch-Lindsay 2004; Harff 2003; Krain 1997) and into the effectiveness of benevolent outside intervention on internal conflict (Doyle and Sambanis 2000; Paris 1997; Diehl, Reifschneider, and Hensel 1996). By highlighting the potential of foreign assistance to affect domestic outcomes, we are adding to a rich literature on the distortionary impact of foreign aid that has hitherto

focused on nondisaster aid (Goldsmith 2001; Bräutigam 2000; Lancaster 1999; Uvin 1998).

The rest of the article is organized as follows. In the section “A Political Model of Disasters,” the model is presented and the terms are defined. The section “Government Spending and Disasters in the Absence of Aid” solves the model in the case of no outside humanitarian relief, while the section “Introducing External Humanitarian Aid” allows for external disaster aid. Policy implications and conclusions are offered.

A Political Model of Disasters

Before making any predictions on the severity of disasters, we set up the model from which the results will be derived.

Disasters, Prevention, and Relief

Assume that a natural shock, such as an earthquake or hurricane, strikes with an exogenous probability q and causes monetary damage k . We assume that governments cannot control the probability of such a shock, only the shock’s impact. We model the impact of the shock as a per capita loss, $k - f(b, a)$, where $f(b, a)$ is the total level of relief from preventive spending done before the shock hits (b) and palliative spending done after the shock hits (a). We assume that f is concave. Preventive and palliative spending may either be complements (that is, a dollar spent on prevention increases the benefit of a dollar spent on relief, e.g., a dam) or substitutes (spending on prevention decreases the per-dollar benefit of spending on relief, e.g., famine relief), and this will play a key role in our analysis. In addition, f has a maximum value of k (disaster aid cannot make improvements that bring utility above the nondisaster state).

We define a disaster as the net impact of a shock, or $k - f(b, a)$. The *initial disaster* is given by $k - f(b, 0)$, the level of damage reported after the shock first hits. In other words, a shock k ’s immediate impact on a population is governed by the amount of disaster prevention b that a government has undertaken. While the net impact of the shock is further determined by any palliative care a , the disaster that makes the newspaper will not yet have been attenuated by the relief activity. For the most part, the distinction between a “disaster” and an “initial disaster” is helpful only in explaining the observed level of disasters around the world. For the purposes of government decision making, $f(b, a)$ and not $f(b, 0)$ is most important.

Government Spending

The government may either spend money on disaster prevention or allocate it to other uses. The government derives utility from two sources: social welfare from

disaster prevention and income that it uses for other purposes. Formally, the government has a utility function $v(w, I)$, where w is social welfare of the population and I is government income. An individual citizen's welfare is given by a utility function $u(y)$, where y is an exogenous level of individual income. If a shock hits, a citizen's income is reduced by $k - f(b, a)$, and hence, her utility drops to $u(y - (k - f(b, a)))$. Following a representative consumer model, we assume

$$v(w, I) = \sum_i \lambda_i u(y_i) + v(I).$$

In words, the government is a Benthamite social planner, assigning different weights λ_i to different regions (the regions are indexed by i). This λ_i reflects the government's inherent interest in region i . We might expect populous regions, swing regions, or politically organized regions to have high values of λ_i . In racially or ethnically polarized countries, λ may even be negative in some regions. $\sum_i \lambda_i u(y_i)$ is simply the weighted average of citizen utility across the country. The government also cares about income, through a concave function $v(I)$. We are assuming that government utility is separable in income and social welfare. If this is not true, then we need to worry about the complementarity or substitutability of these inputs. We present this simpler version that captures all the essential insights of our model without unnecessary technical complications.

This is not a general equilibrium model; we have decided to ignore issues regarding taxation or supply-side responses to government actions, as these are not central issues in our article. In particular, we ignore the fact that government income is actually a function of the income of the citizens of the country.

The form of this utility function should not necessarily be interpreted literally as the way that central governments make decisions, but rather, as a reduced form for a series of vastly more complicated decisions. We also recognize that central government decisions are not perfectly coordinated;⁴ however, we still think that this functional form will capture the most important dynamics. Even though the government may not have preferences directly over these inputs, it will behave as though it does, and hence, this utility function serves as a consistent representation of these preferences.⁵ In addition, one can also interpret our formulation as the reduced form of a more explicitly political model.⁶ We are not as interested in the subtle dynamics of such a model as with the interaction of national governments with international relief organizations, and hence, we will use this reduced form throughout the article.

We abstract from the much larger spending decisions that the central government must make and consider only that the government has a fixed supply of money I to spend on disaster prevention or to put aside for other spending. In this model, each country is made up of n distinct regions to which funds can be allocated, which we index by i . The government spends b_i on prevention and a_i on relief in region i .

Government Spending and Disasters in the Absence of Aid

In this section, we solve the model without strategic interactions with an outside relief agency, derive first-order conditions, and take several comparative statics.

Efficient Disaster Spending

As a reference case, we assume that the government is simply trying to maximize the utility of one representative citizen. Assume that the unit cost of preventive measures is p_b , and of palliative measures, p_a . Hence, the government is solving the problem (recall that q is the probability of a disaster):

$$\max_{b,a} (1-q)u(y-p_b b) + qu(y - (k-f(b,a)) - p_b b - p_a a).$$

However, note that we can write this in terms of two variables of greater interest: the total level of relief, $r=f(b, a)$, and the level of prevention, b . These two variables implicitly define the level of palliative spending:

$$f(a(r, b), b) = r.$$

In words, $a(r, b)$ is the level of palliative aid that must be done to achieve a total level of relief r , given that an amount b of prevention was provided. This implies

$$\begin{aligned} \frac{\partial a}{\partial r} &= \frac{1}{f_a}, \\ \frac{\partial a}{\partial b} &= \frac{-f_b}{f_a}. \end{aligned}$$

In addition, the total cost for this spending is now given by a function $c(r, b)$, defined by

$$c(r, b) = p_a a(r, b) + p_b b.$$

Taking the derivative of this with respect to r ,

$$\frac{\partial c}{\partial r} = p_a \frac{\partial a}{\partial r} = p_a \frac{1}{f_a}, \quad (1)$$

$$\frac{\partial c}{\partial b} = p_a \frac{\partial a}{\partial b} + p_b = p_b - p_a \frac{f_b}{f_a}. \quad (2)$$

Hence, our maximization problem is now

$$\max_{r,b} (1-q)u(y-p_b b) + qu(y - (k-r) - c(r, b)). \quad (3)$$

Taking the derivative of equation 3 with respect to r gives us the first of our two first-order conditions:

$$u'(y - (k-r) - c(r, b)) \left(1 - \frac{\partial c}{\partial r} \right) = 0.$$

Substituting in from equation 2 yields

$$\begin{aligned}
 1 - p_a \frac{1}{f_a} &= 0, \\
 f_a &= p_a.
 \end{aligned}
 \tag{4}$$

Hence, the level of palliative spending is always ex–post efficient, with marginal benefit of a unit of relief f_a equal to its marginal cost p_a . This is because there is no uncertainty involved here; once a disaster has occurred, the government must simply choose how much to invest in mitigating the disaster. This is like any other spending decision. However, this is not the case for the level of preventive spending:

$$\frac{\partial v}{\partial b} = 0 \Rightarrow (1 - q)u'(y - p_b b)(-p_b) + qu'(y - (k - r) - c(r, b))\left(-\frac{\partial c}{\partial b}\right) = 0.$$

For simplicity, we use u^s to denote the level of utility in the shock state and u^{ns} in the no-shock state. Substituting and simplifying, the above equation can be written

$$\begin{aligned}
 f_b &= p_b \left(1 + \frac{(1 - q)u^{ns'}}{qu^{s'}} \right), \\
 \frac{qu^{s'}}{qu^{s'} + (1 - q)u^{ns'}} f_b &= p_b.
 \end{aligned}
 \tag{5}$$

Spending only on prevention has an expected benefit: it only helps if a disaster actually occurs. This makes it inherently less efficient than relief, and after a disaster, the level of prevention may seem too low if one forgets that disasters do not occur with certainty.

The term in front of f_b in equation 5 is precisely the factor that adjusts for this uncertainty. We note that it is increasing in q . This means that if shocks are more likely, more should be spent on prevention relative to relief. In addition, when shocks are more severe, marginal utility is higher in the bad state, which means f_b must fall to maintain the equality, and hence (by the concavity of f), the level of prevention rises. This is related to a standard insurance result: the more that a negative shock hurts an individual, the more she will spend ex ante to prevent it, because she will be very poor (and hence, income will be very valuable) after the shock actually occurs.

Disaster Spending with a Political Government

We now introduce the government utility function described in the section “A Political Model of Disasters.” Recall that the central government is maximizing $\sum_i \lambda_i u(y_i) + v(I)$, or in expected utility,

$$\max_{r, b} q \left(\sum_i \lambda_i u(y_i - (k - r)) + v(I - c(r, b)) \right) + (1 - q) \left(\sum_i \lambda_i u(y_i) + v(I - p_b b) \right).$$

The form of the government’s utility function implicitly assumes that each argument only depends on the sum of the effects across regions (i.e., that there are no regional cross-effects at work). Under this assumption, we can restrict our model to one region.⁷ Thus, the government solves

$$\max_{r,b} V(r, b) = q(\lambda u(y - (k - r)) + v(I - c(r, b))) + (1 - q)(\lambda u(y) + v(I - p_b b)). \quad (6)$$

Differentiating equation 6 with respect to r yields the first of the first-order conditions:

$$\frac{\partial V}{\partial r} = 0 \Rightarrow \lambda u'(y - (k - r)) = v'(I - c(r, b)) \frac{\partial c}{\partial r}.$$

Equation 1 tells us that $\frac{\partial c}{\partial r} = \frac{p_a}{f_a}$; hence, we have

$$\lambda f_a u^{s'} = p_a v^{s'}. \quad (7)$$

The government still sets palliative spending to an ex-post efficient level, only now it has a different definition of efficiency. The left-hand side of equation 7 gives the amount that citizen utility will be raised by an extra unit of relief, $f_a u^{s'}$, multiplied by how much the government cares about that utility, λ . The right-hand side tells how much the extra unit of relief costs, p_a , multiplied by the opportunity cost to the government of not saving that money for other purposes, $v^{s'}$.

We can find the ratio of prevention to relief by differentiating equation 6 with respect to b to find the other first-order condition:

$$\frac{\partial V}{\partial b} = 0 \Rightarrow q v^{s'} \left(-\frac{\partial c}{\partial b} \right) - (1 - q) v^{ns'} p_b = 0.$$

This simplifies to

$$\frac{f_b}{f_a} = \frac{p_b}{p_a} \cdot \left(1 + \frac{(1 - q) v^{ns'}}{q v^{s'}} \right). \quad (8)$$

By the implicit-function theorem, these first-order conditions generate implicit functions, $r(\lambda, y, k, I, p_a, p_b, q)$ and $b(\lambda, y, k, I, p_a, p_b, q)$, that define the optimal levels of relief and prevention based on the exogenous parameters of the system. Hence, we can now differentiate equations 7 and 8 to derive comparative statics and offer predictions on the level of disaster spending, and hence, on the severity of the initial and the total disaster.

Proposition 1: Under reasonable assumptions, governments are more biased toward relief over prevention compared to self-financing individual households. (All proofs are contained in the appendix.)

This is, in essence, a basic insurance/investment result (Arrow and Lind 1970). Governments are less risk averse than individuals over gambles concerning the size

of disasters: while an individual risks getting wiped out, a government usually only faces damage to some small fraction of its economy. Hence, governments are more willing to forego prevention or formal insurance and simply spend in the case that a disaster occurs. Thus, the ex-post revelation of "underprevention" may not always indicate a misjudgment on the part of the government, as one must remember that the level of spending was set ex ante, when the appearance of the shock was uncertain.

Corollary 1.1: Smaller (less populous) countries prepare better for disasters.

This corollary immediately follows from Proposition 1. Since governments are better able to smooth disaster relief from current income than are individuals, so too are governments of large countries better able to smooth disaster relief than are governments of small countries. This implies that small-country governments will spend more on prevention relative to relief than will large-country governments and that the observed initial disaster (before relief has been distributed) will appear larger in big countries than in small countries.

We would like to test this fact empirically. In this article, we will not provide rigorous statistical analysis, which would require a paper in its own right, but will instead present some suggestive aggregate evidence. We assume that disaster preparation can be proxied by the ratio of persons killed to persons affected by disasters. Hence, a high ratio of deaths from disasters to number of people affected by disasters indicates a low level of disaster preparation.⁸

While the following data may suffer from reporting and measurement bias,⁹ we nonetheless compare the average deaths weighted by population from natural disasters in small countries to large countries to illustrate the logic behind Corollary 1.1, and, hence, Proposition 1.

As can be seen in the first column of data in table 1, smaller countries experience a lower annual fatality rate from natural disasters. This may be simply because there are fewer natural shocks to small countries than to large countries. The second column examines this possibility. As can be seen, this does not appear to be the case: persons living in small countries have a higher likelihood of being affected by a natural disaster in a given year. Of course, these results should only be taken as illustrative; as we will argue throughout the article, there are a host of other issues that complicate the story, which any systematic empirical testing of these propositions will have to take into account.

Proposition 2: As long as citizen welfare is not a substitute to government income, richer governments have smaller disasters (i.e., $\frac{\partial r}{\partial I} > 0$).

This result is hardly surprising and has been implicitly noted in the literature. For instance, Kahn (2005) and Strömberg (2007) find that natural shocks are no more likely in poor countries than in rich countries but that poor countries have

Table 1
Annual Number Killed and Affected from Natural
Disasters per Year by Size, 1975 to 2000

	Deaths from Disasters per 1,000,000 People	Persons Affected by Natural Disasters per 1,000 People
Small countries (<500,000 people in year 2000)	12.4 (3.6)	19.4 (1.2)
Large countries (>500,000 people in year 2000)	17.6 (3.6)	17.2 (4.6)

Source: OFDA/CRED (2003).

Note: There are 700 observations for small countries and 4,022 observations for large countries. These statistics begin in 1975 because of the lower quality of data before then. Standard errors in parentheses.

higher mortality from disasters. Freeman, Keen, and Mani (2003, 9) report that poor countries experience more damage from natural disasters as a percentage of GDP than do rich countries. Disaster prevention can be thought of as a normal good whose consumption increases with income. Yet, all governments, poor and rich, that are involved in disaster mitigation will still prioritize their spending.

Proposition 3: The more the government derives utility from social welfare, the less severe the disaster: $\frac{\partial r}{\partial \lambda} > 0$.

Proposition 3 is essentially the bridge between our article and the oft-cited Sen (1983) observation that democracies do not have famines. For whatever reason, whether it is benevolence or accountability, governments that govern in the interest of social welfare should have less severe disasters. Indeed, Kahn (2005) finds that natural disasters have a smaller death toll in democracies.¹⁰

Of course, disasters are not simply a nuisance to governments. Used strategically, they can strengthen the government if they are harnessed as instruments to weaken potential rivals.

Corollary 3.1 (the political effect): Governments spend less on disaster prevention in politically weak or hostile regions.

Politically weak or hostile regions have low levels of λ , and hence, the government will not spend much on these regions. This observation, that disasters will “tend to happen” in opposition-aligned areas, has been noted in Albala-Bertrand (1993, 92, 151) and implicitly noted in the conflict literature on food as a weapon and in the geography literature on vulnerability and marginalization.

The food-as-a-weapon literature documents how famine can be and has been used as a tool of warfare against political enemies, most notably in Ethiopia, where, according to de Waal (1997, 115), the “principal cause of the [Tigray and northern Wollo] famine was the counter-insurgency campaign of the Ethiopian army and air

Table 2
Annual Number Killed and Affected from Natural
Disasters per Year by Ethnic Fractionalization, 1975 to 2000

	Deaths from Disasters per 1,000,000 People	Persons Affected by Natural Disasters per 1,000 People
Low ethnic fractionalization (<43)	8.2 (2.2)*	9.1 (1.5)**
High ethnic fractionalization (≥43)	26.7 (9.1)*	23.9 (2.5)**

Source: OFDA/CRED (2003).

Note: There are 1,430 observations for each group of countries. Ethnic fractionalization data are from Easterly (2001). Standard errors in parentheses.

* $p \leq .05$. ** $p \leq .01$.

force in Tigray and north Wollo during 1980-85." A similar situation existed during the Sudanese civil war (Deng and Minear 1992, 83-119; Keen 1994). In addition, the geography literature stresses that disasters disproportionately affect marginalized groups that have less political power (Mustafa 1998; Hewitt 1998, 85-86; Susman, O'Keefe, and Wisner 1983).

We can offer a brief quantification of this corollary by comparing the damage from disasters in ethnically fractionalized countries with the damage in more homogeneous countries. The implicit mechanism through which a high degree of ethnic fragmentation can lead to higher damage from disasters is that governments of fragmented populations selectively underprevent by region, thus raising the overall expected impact of a natural shock. Table 2 illustrates this, dividing countries into two equal groups.

As can be seen in table 2, highly fragmented countries have approximately three times as many deaths and persons affected as the more homogeneous countries. This is consistent with a lower level of disaster prevention and response in highly fractionalized countries. Clearly, these statistics are only suggestive; other factors, such as a difference in likelihood of natural shocks, may explain some of the difference.

The recent disasters provide vivid evidence of the political effect. After the 2004 tsunami, opposition areas in Indonesia and possibly Sri Lanka were denied the same amount of relief from the impact of the tsunami. The residents unable to flee New Orleans in time to avoid Hurricane Katrina were largely poor and unconnected, and the U.S. government's Federal Emergency Management Agency (FEMA) payments have been criticized for favoring wealthy residents (Kestin, O'Matz, and Maines 2005).

On balance, these effects imply that a sufficiently callous and poor government may choose to invest very low amounts in disaster prevention, especially in politically hostile areas. In the next section, we argue that this becomes even more likely when the possibility of outside aid is introduced.

Introducing External Humanitarian Aid

The presence of international organizations dedicated to the alleviation of suffering has a dramatic effect on the character, form, and—as we will argue—amount of disaster spending in poor countries. There is a quasi-industry of disaster relief (see Macrae 2002) whose front lines include well-known private aid organizations such as CARE, the Red Cross, Oxfam, and World Vision as well as multilateral organizations such as the United Nations Children's Fund (UNICEF) and the World Food Programme. These are funded by a combination of private donations and government grants. Government spending on humanitarian emergencies is dominated by the United States, followed by European Union (EU) member states' collected contributions through the European Community Humanitarian Office (ECHO). Of course, there are other forms of aid relevant to disasters. Remittances from relatives abroad may help individuals, and thus, nations to cope with disasters (Yang 2005).

In our model, international aid (which can be thought of as some combination of private, public, and nongovernmental organization (NGO) aid, although we often abbreviate it to a single NGO for clarity of exposition) only comes in after a disaster has occurred. This is, of course, a simplification of the real world that includes aid for disaster prevention as well as relief. The results of the model will hold so long as the level of international aid for disaster prevention is too low, which certainly seems to be the case (Benson and Clay 2004, 38). Aid agencies complain, for example, that it is much harder to get donations for prevention than for visible emergencies.¹¹ This was clearly demonstrated in the aftermath of the events of September 11, 2001, when the American Red Cross was caught up in a scandal that involved its shifting of earmarked donations from relief to prevention, where it believed the money could be better spent (Curran 2001). Moreover, advocates of disaster spending consistently ask for more attention devoted to prevention, as evidenced in a report by Christian Aid (2005) that quotes statistics suggesting that the marginal value of a dollar of prevention is higher than for relief.

If the international humanitarian community guarantees national governments relief aid, it is in essence insuring them against disasters. Does this insurance generate a moral hazard problem? In other words, do we see a bailout effect, where the low price of palliative aid generates underinvestment in preventive spending? As with any price distortion, there will be two effects: a substitution effect and an income effect. In this case, we believe that income effects are small: bilateral disaster relief to low-income countries composed on average only 0.17 percent of GDP from 1999 through 2003.¹² This would lead one to believe that the substitution effect will dominate, and preventive investment will suffer.

We will assume that if a shock occurs, foreign powers can act after the local government to provide free palliative (but not preventive) aid. We further assume that aid

is distributed optimally; hence, international organizations will be equalizing the marginal benefit of spending across crises, giving aid until the marginal benefit of a dollar of spending is equal to some critical value m .

This means that the NGO is maximizing the following objective function:

$$\max_r O(r) \equiv u(y - (k - r)) - (1 + t)p_a a(r, b)m. \tag{9}$$

The first term is the benefit to the NGO from increasing the utility of the citizens affected by the disaster by r . The second term is the cost of this increase (which is done entirely through palliative relief): $a(r, b)$ is the amount of relief that must be provided to achieve a payoff of r . The cost of this much relief is $(1 + t)p_a a(r, b)$, where t is the “tax” paid on a dollar of aid by humanitarian organizations. This loss could be caused by the fact that foreign organizations are inherently less efficient in unfamiliar territory, that they have higher overhead, or that money is stolen (e.g., through bribes). Note that t could even be negative. For now, we assume that t is exogenous. Finally, m is the opportunity cost of spending the money here rather than elsewhere. Differentiating this equation with respect to r implicitly defines a function $r(b)$ by the first-order condition for the relief agency:

$$\begin{aligned} u'(y - (k - r(b))) &= (1 + t)p_a m \frac{\partial a}{\partial r}, \\ u'(y - (k - r(b)))f_a(b, a(r(b), b)) &= (1 + t)p_a m. \end{aligned} \tag{10}$$

We assume that once a disaster strikes, the government acts before the aid agency in providing palliative aid. Given our modeling of the NGO’s spending until the marginal value of a dollar of relief reaches m , this implies that the government has no incentive to provide any relief unless it wants to provide it at a higher level than the NGO would provide. In that case, we are back to the problem without aid. If the government does decide to rely on outside aid, it is solving the following maximization problem:

$$\max_b q \cdot \lambda u(y - (k - r(b))) + (1 - q)\lambda u(y) + v(I - p_b b). \tag{11}$$

Differentiating equation 11 with respect to b leads to the following first-order condition for the government:

$$q\lambda u'(y - (k - r(b))) \frac{\partial r}{\partial b} = p_b v'(I - p_b b). \tag{12}$$

To find $\frac{\partial r}{\partial b}$, we use standard comparative statics:

$$\begin{aligned} \frac{\partial r}{\partial b} &= \frac{O_{rb}}{-O_{rr}} = \frac{u' \cdot (f_{ba} + f_{aa} \frac{\partial a}{\partial b})}{-(u''f_a + u'(f_{aa} \frac{\partial a}{\partial r}))}, \\ \frac{\partial r}{\partial b} &= \frac{u' \cdot (f_{ba} - f_{aa} \frac{f_b}{f_a})}{-(u''f_a + u' \cdot (\frac{f_{aa}}{f_a}))}. \end{aligned} \tag{13}$$

This expression is positive if $f_{ba}f_a - f_{aa}f_b > 0$. The second term is always positive (by concavity), but the first may be negative if b and a are substitutes; this means that the NGO will cut back on aid rather than increase it when the government increases its spending.

Combining equations 10, 12, and 13 yields the following ratio:

$$\frac{f_b}{f_a} = \frac{p_b}{(1+t)p_a} \frac{1}{q} \frac{v'}{m} \frac{1}{\lambda} \left(\frac{u''}{u'} \frac{f_a}{f_{aa}} + 1 \right) f_a + \frac{f_{ba}}{f_{aa}}. \quad (14)$$

Compare this to the ratio in the no-aid case:

$$\frac{f_b}{f_a} = \frac{p_b}{p_a} \cdot \left(1 + \frac{(1-q)v^{ns'}}{qv^{st'}} \right) \approx \frac{p_b}{p_a} \cdot \left(\frac{1}{q} \right).$$

When will the presence of outside aid cause a distortion in the ratio of the effectiveness of preventive aid to palliative aid, relative to a world without foreign assistance? In other words, when will the existence of outside relief cause governments to place a higher proportion of disaster care on ex-post mechanisms?

Proposition 4: The proportion of disaster relief supplied ex-post rises with the following comparative statics, among others:

1. Relief becomes cheaper for NGOs (i.e., t falls).
2. Governments become poorer relative to NGOs, and the ratio of their marginal utilities of income v'/m rises.
3. The curvature of the utility function of the local population, u''/u' , rises (this happens when populations become poorer and approach a subsistence constraint).
4. Preventive and palliative aid are substitutes rather than complements.

In a world where international agencies provide free relief, governments will allow more of the burden of care to shift to the agencies when any of the above conditions are met.

The first situation is very intuitive. In the first situation, when the “price” of relief aid falls, whether through reduced taxation or higher efficiency, the quantity rises, and the ratio of prevention to relief falls. We can offer a simple exposition of the plausibility of this effect by comparing landlocked countries with nonlandlocked countries. In landlocked countries, the price of relief aid is very high, as it is expensive to bring in aid. As such, *ceteris paribus*, relief agencies will find it more efficient to focus their relief efforts on nonlandlocked countries, which will drive up the fraction of disaster spending on prevention in landlocked countries. Hence, we should expect the initial disaster, proxied for by deaths per capita, to be less severe in landlocked nations. Table 3 examines this proposition.

The figures are suggestive of this first situation’s being borne out in the data. While landlocked countries are more likely to have natural disasters affect their

Table 3
Annual Number Killed and Affected from Natural
Disasters per Year by Landlocked, 1975 to 2000

	Deaths from Disasters per 1,000,000 People	Persons Affected by Natural Disasters per 1,000 People
Landlocked	8.5 (3.9)	22.1 (1.4)*
Not landlocked	19.0 (1.5)	16.3 (3.1)*

Source: OFDA/CRED (2003).

Note: There are 988 observations for landlocked countries and 3,734 observations for nonlandlocked countries. Landlocked status is from Easterly (2001). Standard errors in parentheses.

* $p = .1$.

populations, as indicated by the second column, they experience an annual death rate from natural disasters less than half that of nonlandlocked countries.

The second situation of Proposition 4 is also fairly simple. When the government of the disaster-prone country has a higher marginal utility from income than the NGO, its opportunity cost of disaster aid is higher, and thus, it allows the NGO to "pick up the tab" for the disaster. This implies that the burden of care shifts from prevention to relief.

In the third situation, when the curvature of the utility function of the local population is high, it means that not only is the marginal utility of income high, but taking away any income will also cause utility to drop at an accelerating rate. Hence, even if the government cuts back on prevention, making relief less efficient, the NGO will not cut back very much on relief. Even though relief is now less effective in dollar terms, in utility terms, it is still almost as effective as before because of the fact that the marginal utility of income has risen significantly with the drop in the income of the local population. So the NGO will almost completely compensate for this pullback. This makes shirking on prevention even more appealing.

The fourth situation, in which the substitutability of preventive and palliative aid implies a lower ratio of prevention to relief, describes the case in which preventive spending is not a prerequisite for effective relief. In other words, if people can be made better off by either spending on prevention or relief, then the government will sit back and underprevent, allowing the burden to be picked up in the form of relief by the aid agencies. If, on the other hand, relief is only productive when preventive expenditures have already been undertaken (relief and prevention are complements), the existence of outside relief may actually cause an increase in preventive spending. Such a case can easily be imagined: relief to a flood zone can be provided only when a levee has been constructed (even poorly), but when it has never been built at all, relief aid may be futile (or even impossible).

Corollary 4.1 (the bailout effect): The presence of outside relief can increase the severity of the initial disaster.

Distortions caused by the existence of external aid to the proportion of relief (Proposition 4) imply that the level of preventive spending is reduced when the income effect is dominated by the substitution effect. As we have argued above, international relief is a tiny fraction of the GDP of poor countries; free relief will change the amount of prevention they do primarily through the substitution effect of relief's being cheaper. Whatever income effect the government gets from free relief will most certainly be spent on other programs, such as education or the military. Thus, when the substitution effect dominates the income effect, the situations described in Proposition 4 are also the situations in which free relief will result in underprevention, and hence more severe initial disasters.

This relatively simple application of moral hazard is similar to other literature, from financial crises (Fischer 1999) to insurance (Shavell 1979), and as a general insight, it is known as the "Samaritan's Dilemma" (Buchanan 1975; Coate 1995). Essentially, the bailout effect is the following: if prevention is costly and relief is free, governments will underspend on prevention. This is not to say that there will be no spending on floodplain management or on making sure that buildings are built to withstand earthquakes, but rather that at the margin, fewer dollars will be spent on preventive activities than would be the case in the absence of free humanitarian relief.

This distortion has been noted in the disaster literature. As Cuny (1983) points out, the expectation of international aid can delay the government's own spending on disaster mitigation. Freeman, Keen, and Mani (2003) note that private individuals and firms, expecting government bailouts in the event of a disaster, will purchase less insurance.

Ethiopia, a nation that regularly makes headlines for famine threat, is a salient example. Because relief aid is forthcoming for the perennially food-insecure country, it can delay reforms that seek to address the underlying issues of food security. Ethiopia has faced almost perpetual drought and crop failure since 1984, sounding donor alarm bells each year. For each of the years 2000, 2002, and 2003, more than ten million Ethiopians are reported as being affected by the drought, yet no deaths were recorded—suggesting almost complete international bailouts. The availability of competently delivered outside food aid means that the Ethiopian government does not need to stake its political future on solving the food-insecurity problem. Certainly, it needs to expend some resources to improve the situation, yet resources that would have been spent on alleviating the structural causes of hunger in the absence of global humanitarians are freed up for other purposes.

However, for the bailout effect to apply, governments must be suitable candidates for the international humanitarian apparatus. The bulk of relief aid originates

from western governments and their citizens, but their compassion does not reach all areas of the globe equally.

Corollary 4.2: Pariah states that are not bailed out by international organizations will invest more in disaster prevention.

In essence, this corollary states that if a country will be left to fend for itself in the event of a shock, its leadership will take the necessary precautions to prevent disaster. Moreover, should disaster strike, politicians will not dally in administering relief. We are not aware of this point's having been made previously in the disaster literature.

We illustrate this point by looking at two key pariah states in the latter half of the twentieth century¹³: Libya under Muammar Al Qadhafi and South Africa under the Apartheid regime. Since Qadhafi came to power in 1969, Libya has had only one natural disaster recorded in the OFDA/CRED database. A flood occurred in 1995 when troubles with the "great man-made river" water pipeline caused \$42 million in damages. The pipeline had been insured and no one was killed. In contrast, Algeria (albeit with a population six times as large) had fifty-eight natural disasters during the same time period, with a total of 6,700 deaths and \$10.6 billion in damages. Even the wealthy Tunisia (with a population twice as large as Libya's) had thirteen natural disasters leading to 840 deaths and \$418 million in damages.

In South Africa, the Apartheid regime was an international pariah between 1962, when the United Nations first urged its members to break ties with South Africa, and early 1990, when then-President F. W. de Klerk freed Nelson Mandela from prison and lifted restrictions on opposition groups. During this time period, 808 people were killed from natural disasters in South Africa. From March 1990 through the end of 2002, 920 people were killed. This occurred against a backdrop of 1.2 million deaths in Africa from natural disasters between 1962 and 1989 inclusive and 95,000 deaths between 1990 and 2002. In other words, while Africa as a whole reduced the mortality from natural shocks by more than 90 percent, South Africa—no longer a pariah state—increased its mortality from disasters by 10 percent.

Endogenizing Theft

The literature on humanitarian aid in conflict situations is very sensitive to the possibility of aid's getting stolen and misused. Recent works by Anderson (1999), Lautze (1997), Prendergast (1996), and others have explored operational frameworks to minimize the potential of theft and misuse of relief in conflict. Yet, the potential for theft also exists in natural-disaster relief, which in turn may affect the severity of the disaster.

To understand this possibility, we assume that t —the tax on NGO spending—is composed solely of money stolen by the central government from aid organizations and that this money flows directly into government coffers. In this case, the government's maximization problem changes to

$$\max_b q \cdot (\lambda u(y - (k - r(b))) + v(I - p_b b + ta(r(b), b))) + (1 - q)(\lambda u(y) + v(I - p_b b)).$$

This leads to the slightly modified first-order condition:

$$q \left(\lambda u'(y - (k - r(b))) + tv'(I - p_b b + ta(r(b), b)) \frac{1}{f_a} \right) \\ \frac{\partial r}{\partial b} = p_b (qv'(I - p_b b + ta(r(b), b)) + (1 - q)v'(I - p_b b)).$$

How will this affect the level of preparedness? The general case is complicated, as there are income effects to consider. However, the substitution effect is clear:

Proposition 5 (the racket effect): If preventive aid and palliative aid are substitutes, then the presence of theft will always bias prevention downward. If they are complements, the effect is uncertain.

In other words, if a marginal dollar spent on prevention decreases the level of NGO relief spending, then the government will receive less income. This gives the government even less incentive to invest: not only does it have to spend more on prevention, but it also gets less relief to steal. On the other hand, if a marginal dollar spent on prevention increases relief spending because prevention and relief are complements, then the government can earn more money from theft by spending more on prevention. As before, we believe that the income effect (which is still at work here) is small.

In essence, Proposition 5 is a very strong version of the bailout effect. Whereas the bailout effect concerns a costless cure that lowers prevention, the racket effect deals with a cure that not only is costless but may also in fact be profitable. This not only reduces prevention but may lead to deliberate negligence on the part of the government in allowing natural shocks to become disasters. At the extreme, leaders can create disasters to attract humanitarian aid to steal, as a quotation from an American aid worker in West Africa attests:

A Liberian warlord said to me one day, "I can starve a village until the children die, and then you will come with food and medicine which I will take, and no one can do anything about it." (Montalbano 1997, A1)

But more subtle forms of the racket effect are possible as well. During the humanitarian crisis that occurred as a result of the 2001 war in Afghanistan, the Taliban

imposed a tax of thirty-two dollars per metric ton brought in by UN World Food Program convoys (*Boston Metro* 2001, 4). Earthquake aid to Nicaragua in 1972 was diverted to the Somoza family (Albala-Bertrand 1993, 191).

This observation, that the potential siphoning of relief can drive the actions of leaders, has been heavily noted in the literature on humanitarian aid in conflict situations during the past decade (Duffield 2001; Anderson 1999; Marren 1997; African Rights 1994). However, it has not yet been applied to regular governments in their prevention and mitigation of natural disasters. As noted in the humanitarian literature, war makers can steal some of the aid resources to further their military aims. Thus, the provision of aid in a conflict situation when aid gets stolen can be somewhat of a dilemma: aid may reduce suffering but at the same time further the conflict. In contrast, lootable aid cannot further a natural disaster *ex-post*, but—as our model implies—it can provide distortionary incentives against disaster prevention *ex ante*. Indeed, our racket story may have as much in common with Akerlof et al.'s (1993) looting model of bankruptcy for profit. The racket effect will not affect all governments equally, however. Those who more desperately need funding will respond more strongly.

Corollary 5.1: Poorer governments react more strongly to the racket effect.

Simply through diminishing marginal utility of government income, richer countries will be less tempted by the potential for aid racketeering. It is quite a severe policy to allow the suffering of one's own population to get income and foreign exchange, and only the most desperate of governments with the highest marginal utilities of income would be willing to go to such lengths. Those governments, quite simply, are the ones with virtually no other source of income.

The classic government that fits this description is not a normal member of the international system that can tax its subjects, levy import duties, and appeal for international loans and aid, but rather a rebel government that—barring the presence of mineral resources or a strong diaspora—must rely on a weak and exhausted local tax base and income from taxing humanitarian relief. This factor should contribute to the observation that famines and drought seem to characterize rebel-held areas in civil wars, especially wars that are not over mineral resources. Additionally, Somalia's barren war of the early 1990s featured the manipulation of humanitarian aid as a prominent feature of the conflict (Peterson 2000). Recently, the North Korean government has insisted that aid be delivered through capital projects and centralized government-run food-disbursal mechanisms, both of which are much more easily expropriated than direct aid to the poor (Fairclough 2006).

Finally, we endogenize the government's choice of the level of theft. In general, this is a complex problem without clear predictions. However, we would like to emphasize one important idea:

Proposition 6 (the desperation effect): The worse the impact of a shock on their citizens (i.e., the lower the value of, $y - k$, the citizen's income prior to relief), the more governments will steal from NGOs:

$$\frac{\partial t^*}{\partial (y - k)} < 0.$$

The intuition behind this effect is simple: since the local population is in bad shape, the NGO gets a very high marginal benefit from treating it, and therefore, it is not very sensitive to the price of relief aid. A flagrant example of the desperation effect occurred during the war- and drought-induced famine in Somalia during 1992. More than four million Somalis were at risk for starvation (Peterson 2000, 43). Absent the conflict, Somalia is a fairly efficient place for relief distribution. It has multiple ports and a barren landscape, making travel relatively easy. But in this situation, humanitarian organizations were forced to go to extensive lengths to get food to the potential victims of the famine, and they were taxed by the “government” at every step along the way. Warlords charged relief agencies thirty dollars per metric ton to keep their food in the port while waiting for safe escorts into the country (Lorch 1992). Operating within Somalia was so dangerous that even the Red Cross resorted to hiring armed guards to protect the convoys against theft from bandits and local warlords (Auvinen and Kivimäki 2000, 220), an additional transfer of wealth to the so-called authorities inside the country. But given how dire the situation was, humanitarians were willing to continue delivering aid even with the high levels of theft and taxation, and this opportunity was seized on by the Somali power brokers.

Implications and Conclusions

The results of this article have important implications for the policies of disaster assistance. Our general policy implications are fourfold: invest in prevention, decentralize relief, encourage political development, and reward nondisasters. First, the need for prevention stems from the moral hazard problem that free relief generates. If the international community is willing to give relief to poor countries that have natural disasters, it should also recognize the perverse incentives this relief confers on the governments of poor countries. Thus, if wealthy nations are going to offer free relief, they should also offer free prevention.¹⁴ There is already a massive base of knowledge on disaster prevention and preparedness, with multiple journals dedicated to just that. Related concepts include regulation, insurance, and liability (Zeckhauser 1996).¹⁵ For instance, grants can be made to poor governments to develop and police regulations that pass the costs of the disaster on to those who assume the risks.

Second, decentralization of relief can combat both the political effect and the racket effect, if it is politically feasible. If governments know that the affected area

will get direct relief, the political benefits of a disaster are reduced, as the opposition population is less damaged. Moreover, the racket effect will be reduced, since the central government can no longer gain financially from the assistance. Of course, there may be reduced efficiency if the aid agency must deliver the aid directly to the victims rather than route it through the central government. Such a loss in efficiency would have to be weighed against the losses through the political effect and the racket effect from a centralized form of delivery.

The third implication is political development: as governments become more responsive to their population and as intrastate conflicts decrease, the severity of disasters will naturally fall. This, in addition to the improved technology of disaster prevention and mitigation, is probably responsible for the dramatic fall in deaths from disasters during the course of the last century. This is yet one more reason to work toward better and more accountable states.

The fourth implication is to reward nondisasters: with the current institutions of relief, and through the racket effect, governments get financially rewarded when they have disasters. In other words, additional payments come during "bad times" while nothing happens during "good times." In this article, we have argued that governments can affect the probability of bad times that are triggered by natural shocks. Optimally, governments would get rewarded for good prevention actions.

The propositions of the model offer a host of empirical predictions that further research may be able to validate. In particular, careful empirical examination may be able to delve further into the possibility raised with the summary statistics of this article that smaller, more homogeneous, pariah, and landlocked countries better prepare for disasters. Such an investigation will have to properly deal with issues of reporting bias, measurement error, omitted variable bias (the size of the "true" underlying natural shock), and the question of what types of deaths can be prevented through preventive disaster spending and what deaths can be prevented through palliative spending. Other potential avenues for empirical research include comparing unitary versus federal states and using U.S. states as a microcosm for the world, where the federal government acts like the outside humanitarian relief agency in our model.

Of course, the U.S. government is hardly an efficient responder. Sobel and Leeson (2006) explain the suboptimal response to Katrina through a public-choice framework. Garrett, Marsh, and Marshall (2006) describe how political factors held up the government's market-oriented reforms in agricultural disaster relief.

With the onset of global warming, it is likely that the incidence of natural shocks will only increase in the years ahead (UNEP 1999). In addition, rising inequality between rich and poor countries combined with a commitment on the part of developed countries to increase foreign aid disbursements indicates that international relief in natural disasters will grow. In this article, we have argued that the relief enters, and affects, a very political situation. We have also argued that the political economy of natural disasters is understandable and predictable.

Disaster relief is one of the most basic and important transfers of wealth between developed and developing countries. Given correctly, disaster assistance can smooth shocks to poor countries that might otherwise be debilitating. Like all transfers, however, it can distort incentives or be manipulated by self-interested leaders. The contention of this article is that policy makers ought to craft natural-disaster relief to minimize these distortions and manipulations. The “natural” side of disasters is tragic enough that domestic policies and the actions of international relief should be designed to mitigate, rather than exacerbate, the wrath of nature.

Notes

1. There is extensive debate on the definition of *disaster*—at least two edited volumes are dedicated solely to this task (Quarantelli 1998; Perry and Quarantelli 2004).

2. White (2003) surveys the estimates for each war. Estimates for World War I are on the order of ten million, and for World War II, on the order of fifty million.

3. This decrease is probably underreported because of improvements in data collection.

4. See Rosenthal and Kouzmin (1997) for a discussion of government coordination around natural disasters.

5. For example, a corrupt kleptocracy may care only about stealing as much money as possible, whereas a benevolent president may care only about the social welfare of the general population. The kleptocracy will still attempt to guarantee some level of social welfare (to avoid a revolution). The benevolent president also cares about money (e.g., to finance a reelection campaign). But these different forms of government will have extremely different marginal utilities from these inputs.

6. For example, assume that we are embedded in a more complicated game in which voters only reelect candidates whom they believe are better than some (stochastically chosen) challenger and that voting costs and political benefits vary with income. Then we may end up with a government’s probability of re-election being a function of average voter utility, $p(u(y))$. If the benefits to re-election are equal to R (again, this could be the reduced form of a more complicated game with multiple election cycles), then the government cares about voter utility to the extent that it cares about $p(u(y)) \cdot R$. If $p(u(y))$ is approximately linear, this is then $pRu(y)$. Hence, λ can be interpreted as the product pR , where p measures how accountable politicians are to voters (i.e., how easily they can be thrown out of office) and R measures the rents the politician accrues when he is reelected.

7. With multiple regions, we would simply have regional subscripts on λ and y in the following analysis.

8. In our model, we are not considering the fact that governments may care about deaths as separate from economic damage.

9. For example, countries may overstate the size of a disaster to gain extra aid. This tendency may vary systematically with a number of country characteristics.

10. Strömberg (2007) finds weaker support for this hypothesis.

11. Private communication, Oxfam America executive, December 2005.

12. Source: SourceOECD and World Bank WDI databases.

13. Rigorous empirical tests are difficult, as pariah states have strong incentives to underreport deaths and other damage from disasters.

14. In a more generic statement of this problem, Coate (1995) argues for insurance transfers to poor people facing risks under circumstances with rich altruists to avoid the bailout effect.

15. Pollner (2001) describes potential solutions in finance and insurance.

References

- Abney, F. Glenn, and Larry B. Hill. 1966. Natural disasters as a political variable: The effect of a hurricane on an urban election. *American Political Science Review* 60 (4): 974-81.
- African Rights. 1994. Humanitarianism unbound? Current dilemmas facing multi-mandate relief operations in political emergencies. London: African Rights Discussion Paper No. 5.
- Akerlof, George A., Paul M. Romer, Robert E. Hall, and N. Gregory Mankiw. 1993. Looting: The economic underworld of bankruptcy for profit. *Brookings Papers on Economic Activity* 2:1-73.
- Albala-Bertrand, J. M. 1993. *Political economy of large natural disasters*. Oxford, UK: Clarendon.
- Anderson, Mary B. 1999. *Do no harm: How aid can support peace—or war*. Boulder, CO: Lynne Rienner.
- Arrow, Kenneth J., and Robert C. Lind. 1970. Uncertainty and the evaluation of public investment decisions. *American Economic Review* 60 (3): 364-78.
- Auvinen, Juha, and Timo Kivimäki. 2000. Somalia: The struggle for resources. In *War, hunger, and displacement*, ed. Wayne Nafziger, Frances Stewart, and Raimo Väyrynen, 187-230. New York: Oxford University Press.
- Benson, Charlotte, and Edward J. Clay. 2004. Understanding the economic and financial impact of natural disasters. *Disaster risk management series No. 4*. Washington, DC: World Bank.
- Blaikie, Piers, Terry Cannon, Ian Davis, and Ben Wisner. 1994. *At risk: Natural hazards, people's vulnerability, and disasters*. New York: Routledge.
- Bommer, Julian. 1985. The politics of disaster—Nicaragua. *Disasters* 9 (4): 270-78.
- Boston Metro*. 2001. UN has trouble getting food to Afghanistan. October 12-14, 4.
- Bräutigam, Deborah. 2000. *Aid dependence and governance*. Stockholm: Almqvist and Wiksell International.
- Buchanan, James. 1975. The Samaritan's dilemma. In *Altruism, morality and economic theory*, ed. Edmund S. Phelps. New York: Russell Sage.
- Coate, Stephen. 1995. Altruism, the Samaritan's dilemma, and government transfer policy. *American Economic Review* 85 (1): 46-57.
- Christian Aid*. 2005. Don't be scared, be prepared: How disaster preparedness can save lives and money. December.
- Cuny, Frederick C. 1983. *Disasters and development*. New York: Oxford University Press.
- Curran, Kevin. 2001. Red Cross diverts donations from Sept. 11 victims. *NewsMax.com*. October 31.
- Davis, Morris, and Steven T. Seitz. 1982. Disasters and governments. *Journal of Conflict Resolution* 26:547-68.
- Deng, Francis M., and Larry Minear. 1992. *The challenges of famine relief: Emergency operations in the Sudan*. Washington, DC: Brookings Institution.
- de Waal, Alex. 1997. *Famine crimes: Politics & the disaster relief industry in Africa*. Oxford: James Currey.
- Diehl, Paul F., Jennifer Reifschneider, and Paul R. Hensel. 1996. United Nations intervention and recurring conflict. *International Organization* 50 (4): 683-700.
- Diggins, William, James D. Wright, and Peter H. Rossi. 1979. Local elites and City Hall: The case of natural disaster risk-mitigation policy. *Social Science Quarterly* 60 (2): 203-17.
- Downton, Mary W., and Roger A. Pielke Jr. 2001. Discretion without accountability: Politics, flood damage, and climate. *Natural Hazards Review* 2 (4): 157-66.
- Doyle, Michael W., and Nicholas Sambanis. 2000. International peacebuilding: A theoretical and quantitative analysis. *American Political Science Review* 94 (4): 779-801.
- Duffield, Mark. 2001. *Global governance and the new wars*. New York: Zed.
- Easterly, William. 2001. Global development network growth database. Washington, DC: World Bank. http://siteresources.worldbank.org/INTRES/Resources/469232-1107449512766/648083-1108140788422/Lost_Decades_Social_Indicators_and_Fixed_Factors.xls

- Erikson, K. 1976. *Everything in its path: Destruction of community in the Buffalo Creek flood*. New York: Simon & Schuster.
- Fairclough, Gordon 2006. In North Korea, a plan to solve aid dilemma. *Wall Street Journal*, February 22.
- Fischer, Stanley. 1999. On the need for an international lender of last resort. *Journal of Economic Perspectives* 13 (4): 85-104.
- Freeman, Paul K., Michael Keen, and Mithukumara Mani. 2003. Dealing with increased risk of natural disasters: Challenges and options. IMF Working Paper WP/03/197. Washington, DC: Fiscal Affairs Department.
- Garrett, Thomas A., Thomas L. Marsh, and Maria I. Marshall. 2006. Political allocation of U.S. agriculture disaster payments in the 1990s. *International Review of Law and Economics* 26 (2): 143-61.
- Garrett, Thomas A., and Russell S. Sobel. 2003. The political economy of FEMA disaster payments. *Economic Inquiry* 41 (3): 496-509.
- Goldsmith, Arthur A. 2001. Foreign aid and statehood in Africa. *International Organization* 55 (1): 123-48.
- Harff, Barbara. 2003. No lessons learned from the Holocaust? Assessing risks of genocide and political mass murder since 1955. *American Political Science Review* 97 (1): 57-73.
- Hewitt, Kenneth. 1998. Excluded perspectives in the social construction of disaster. In *What is a disaster? Perspectives on the question*, ed. E. L. Quarantelli, 75-91. New York: Routledge.
- Kahn, Matthew. 2005. The death toll from natural disasters: The role of income, geography, and institutions. *Review of Economics and Statistics* 87 (2): 271-84.
- Keen, D. 1994. The functions of famine in Southwestern Sudan: Implications for relief. In *War & hunger: Rethinking international responses to complex emergencies*, ed. Z. Macrae and A. Zwi, 111-24. London: Zed Books.
- Kestin, Sally, Megan O'Matz, and John Maines. 2005. FEMA reimbursements benefit higher income groups, records show. *South Florida Sun-Sentinel*, December 11.
- Krain, Matthew. 1997. State sponsored mass murder: The onset and severity of genocides and politicides. *Journal of Conflict Resolution* 41:331-60.
- Kreps, Gary A. 1998. Disaster as systemic event and social catalyst. In *What is a disaster? Perspectives on the question*, ed. E. L. Quarantelli, 31-55. New York: Routledge.
- Lancaster, Carol. 1999. *Aid to Africa*. Chicago: University of Chicago Press.
- Lautze, S. 1997. Saving lives and livelihoods: The fundamentals of a livelihoods strategy. Medford, MA: Feinstein International Famine Center, Tufts University. <http://famine.tufts.edu/pdf/lives.pdf>.
- Lorch, Donatella. 1992. Effort to get food out to Somalis falls prey to arms and frustration. *New York Times*, December 6, 1.
- Macrae, Joanna, ed. 2002. The new humanitarianisms: A review of trends in global humanitarian action. *HPG Report No. 11*, April. London: Overseas Development Institute.
- Marren, Michael. 1997. *The road to hell*. New York: Simon & Schuster.
- Montalbano, W. D. 1997. Is giving aid worth the risk? *Los Angeles Times*, January 25, A1.
- Mustafa, Daanish. 1998. Structural causes of vulnerability to flood hazard in Pakistan. *Economic Geography* 74 (3): 289-305.
- OFDA/CRED. 2003. EM-DAT: The OFDA/CRED International Disaster Database. Brussels: Université Catholique de Louvain. Version May 2003. www.cred.be/emdat.
- Olson, Richard Stuart. 2000. Toward a politics of disaster: Losses, values, agendas, and blame. *International Journal of Mass Emergencies and Disasters* 18 (2): 265-87.
- Paris, Roland. 1997. Peacebuilding and the limits of liberal internationalism. *International Security* 22 (2): 54-89.
- Perry, Ronald W., and E. L. Quarantelli, eds. 2004. *What is a disaster? More perspectives*. Philadelphia, PA: Xlibris.
- Peterson, S. 2000. *Me against my brother*. New York: Routledge.

- Platt, Rutherford H. 1999. *Disasters and democracy: The politics of extreme natural events*. Washington, DC: Island.
- Pollner, John. 2001. *Managing catastrophic disaster risks using alternative risk financing and pooled insurance structures*. Finance, Private Sector and Infrastructure Department, Latin America and Caribbean Region. Washington, DC: World Bank.
- Prendergast, J. 1996. Providing aid without sustaining conflict, part two: Ten commandments. In *Front-line diplomacy: Humanitarian aid and conflict in Africa*, 53-110. Boulder, CO: Lynne Rienner.
- Quarantelli, E. L., ed. 1998. *What is a disaster? Perspectives on the question*. New York: Routledge.
- Reeves, Andrew. 2005. *Political disaster? Presidential disaster declarations and electoral politics*. Cambridge, MA: Harvard University. Mimeo.
- Reliefweb. 2005. Current natural disasters. <http://www.reliefweb.int/> (accessed November 2005).
- Rosenthal, Uriel, and Alexander Kouzmin. 1997. Crises and crisis management: Toward comprehensive government decision making. *Journal of Public Administration Research and Theory* 7 (2): 277-304.
- Sen, Amartya. 1983. *Poverty and famines: An essay on entitlement and deprivation*. Oxford, UK: Oxford University Press.
- Shavell, Steven. 1979. On moral hazard and insurance. *Quarterly Journal of Economics* 93 (4): 541-62.
- Sobel, Russell S., and Peter T. Leeson. 2006. Government's response to Hurricane Katrina: A public choice analysis. *Public Choice* 127 (April): 55-73.
- Strömberg, David. 2007. Natural disasters, economic development, and humanitarian aid. *Journal of Economic Perspectives* 21 (3): 199-222.
- Susman, Paul, Phil O'Keefe, and Ben Wisner. 1983. Disasters, a radical interpretation. In *Interpretations of calamity*, ed. K. Hewitt, 263-83. Boston: Allen and Unwin.
- United Nations Environment Programme (UNEP). 1999. *Global environmental outlook 2000*. <http://www.unep.org/geo2000/index.htm>.
- Uvin, Peter. 1998. *Aiding violence: The development enterprise in Rwanda*. West Hartford, CT: Kumarian.
- Valentino, B., P. Huth, and D. Balch-Lindsay. 2004. Draining the sea: Mass killing, genocide, and guerrilla warfare. *International Organization* 58 (2): 375-407.
- White, Gordon. 2003. *Historical atlas of the twentieth century*. <http://users.erols.com/mwhite28/20centry.htm> (accessed March 25, 2003).
- Yang, Dean. 2005. *Coping with disaster: The impact of hurricanes on international financial flows, 1970-2001*. Ann Arbor: University of Michigan. Mimeo.
- Zeckhauser, Richard. 1996. The economics of catastrophes. *Journal of Risk and Uncertainty* 12:113-40.