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ARTICLES

Un-Therapeutic Communities: A Cross-National Analysis of Post-Disaster Political Unrest*

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A recurring question in the study of disaster effects involves political instability. A relationship has been posited between disasters and various forms of political unrest, and case evidence exists to support the contention. Statistical testing, however, has been lacking. A pilot study, this paper integrates a worldwide-disaster database with a political-instability database and reports time-series cross-section (pooled time-series) findings for 12 countries struck by rapid-onset natural disasters between 1966 and 1980. The regression results, both strong and significant, indicate a positive relationship between disaster severity and political unrest. The unrest, however, can be dampened if not eliminated by governmental repression, the implications of which are most disturbing.

Introduction

Scholarly attention to the nature and causes of political instability has come in three great spurts or, to risk some semantic confusion, waves. The first came on the heels of the post-World War II decolonization process. At this time, in the context of the Cold War and a growing U.S. preoccupation with political instability in the "new countries," academics trained their

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intellectual sights on both classic revolutions and generic instability. Although Brinton (1938) must be considered the inspiration, the highlights were the works of Davies (1962), Johnson (1966), Gurr (1968, 1970, 1974), Feierabend and Feierabend (1966, 1972), and Hibbs (1973).

Coinciding with concern over the failure of development—or at least economic growth—to alleviate poverty and income gaps in a variety of countries, the second wave narrowed the analytic focus to the relationship between income inequality and political violence (Muller 1985; Muller and Seligson 1987; Midlarsky 1988, 1989; Muller, Seligson, and Fu 1989). Various of these studies have sparked continuing interpretative and methodological debates (Brockett 1992; Wang 1993; Dixon, Muller, and Seligson 1993). Others, notably Gasiorowski (1995), have refocused attention on economic crises and regime change, which overlaps somewhat with the most recent wave of political instability literature, on democratization's own "Third Wave" (Diamond, Linz, and Lipset 1990; Diamond 1991; Przeworski 1991; and Huntington 1991).

Missing in previous analyses of political instability, however, is consideration of natural disasters and their impacts, which are often traumatic in both the short- and long-term. Literature from the multidisciplinary field of disaster research, however, has often referenced a connection between politics and disaster. For example, Freudenheim (1979) focused on how political problems affect disaster assistance, concerns that Drabek (1986, pp. 245–246) also reflected in his compilation of findings in the field. With a related focus, Davis and Seitz (1982) and Seitz and Davis (1984) carried out quantitative studies of the relationship between regime type, mismanagement, and levels of disaster damage.[1] Two authors, however, have been most explicit about a causal arrow *from* disasters *to* political instability. The first was Cuny, who argued more than 14 years ago in *Disasters and Development* that:

> Disasters often highlight the social struggles in a society and underscore the inherent inequities within a political system.... A disaster makes it very evident that the poor are vulnerable because they are poor, and this can lead to profound political and social changes within a society: many governments destabilize in the years immediately following a disaster (1983, p. 54, emphasis added).[2]

More recently, in *The Political Economy of Large Natural Disasters*, Albala-Bertrand (1993) argued that primary postimpact disaster problems are not so much economic as social and political. Indeed, one of his core findings was that disasters do not have the generally feared massive and negative macroeconomic impacts, but they do have significant and divisive internal socioeconomic and therefore political effects. Indeed, concurring

with Cuny on this point, Albala-Bertrand argues that a disaster both highlights and exacerbates a society's internal contradictions, especially differential group or class "entitlements" to relief in the short-term and safety and well being in the long-term. Specifically in the context of this broader argument, Albala-Bertrand posits "*a high correlation* especially *between [numbers of] primary victims* and both international assistance and *overall political unrest*" (1993, p. 105, emphasis added).

The problem is that neither Cuny, Albala-Bertrand, nor anyone else for that matter, has systematically tested these assertions about a relationship between disasters and political instability. We are especially concerned with the Albala-Bertrand assertion of a "high correlation" between primary-victim numbers and political unrest because he offers little to support that statement.[3] At the same time, intriguing case evidence can be adduced, which is where we want to start our substantive explorations for this paper.

Five Cases

Case 1. In 1970, a typhoon intensified over the Indian Ocean and bore down on a particularly vulnerable and very poor part of a geographically divided South Asian country. Eventually, approximately 300,000–400,000 people (no one will ever know the exact number) died in the disaster, all of them in the eastern portion of the divided country. Enraged by the lack of attention and help from their national capital, which happened to be in the more wealthy western portion of the country, various preexisting dissident political factions united to fight for independence of the eastern portion. In 1971, after a civil war and external intervention, a new country emerged that changed not only the map of South Asia, but also the balance of power in the entire region. This disaster-politics profile is for East Pakistan/Bangladesh (see Kim and Ziring 1977, pp. 209–222; Cuny 1983, p. 54; and Albala-Bertrand 1993, p. 194).

Case 2. On December 23, 1972, an earthquake measuring 6.4 on the Richter scale devastated the capital city of a Central American nation ruled for 40 years by a repressive family dynasty. Slightly short of three years later, a previously struggling revolutionary movement became a visible and major threat to the government. Four years after that, in 1979, this movement led a successful multiclass insurrection through a civil war that ended the dynasty, sent its principals into exile, and established an entirely new regime. Well known in disaster research, this disaster-politics profile is for Nicaragua (see—among many others—Woodward 1985, pp. 221–223 and 260; Dore 1986, pp. 322–323; Anderson 1988, pp. 179–180; and Bulmer-Thomas 1991, pp. 256–257).

Case 3. On September 18, 1974, a hurricane made landfall on the east coast of a Central American republic almost totally dependent for foreign exchange on banana exports. Killing 8,000 people and devastating large areas of prime agricultural land at a time when the military government of the country was (1) divided internally over the pace and direction of agrarian reform and (2) locked in a bitter battle with several multinational corporations over a new banana-export tax, the disaster was followed within a few months by a major factional change within the military government and significant policy alterations. This lesser known profile is for Honduras (see Dunkerley 1988, p. 555).

Case 4. On February 4, 1976, an earthquake measuring 7.5 on the Richter scale left a swath of destruction across the rural midsection of a Central American nation ruled for more than 20 years by an institutionalized military noted for its brutal repressiveness. Within two years, the military government changed leadership and policy direction, then relapsed into another brutal phase after encountering earthquake-struck communities that had begun to organize autonomously. Subsequently, however, the military began to return at least nominal political authority to civilians and initiated a process of democratization. This is the disaster-politics profile for Guatemala (see SAIS Study Group 1985, p. 8; Dunkerley 1991, pp. 144–145; Granados 1992, pp. 97–98; and Perera 1993, pp. 272–275; difficult to secure because of very limited circulation, Bates 1982 also reflects some of the political repercussions of the disaster, although more from a social change perspective).

Case 5. On September 19 and 20, 1985, "twin" earthquakes measuring 8.0 and 7.0 on the Richter scale caused spectacular destruction in the capital of a Spanish-speaking North American country whose regime was best defined as one-party authoritarian and that had been in power at the time of the disaster for more than 50 years. Entirely new groups emerged from the disaster and placed serious procedural as well as substantive demands on the political system. Three years later, in 1988, a galvanized leftist coalition captured a majority of the votes in the capital city, but "lost" the patently fraudulent national presidential election. The regime, however, faced its gravest legitimacy crisis in decades. Another well known disaster-politics profile, this is for Mexico (see—again among many others—Schroeder 1985, p. 843; Cockroft 1990, pp. 39–40; Annis 1991, p. 100; Smith 1991, pp. 388–389; Castañeda 1993, p. 224; Cothran 1994, p. 178; Hellman 1994, p. 136; Tangeman 1995, pp. 63–65; and Krauze 1997, pp. 765–767).

In short, an impressive stock of case evidence has accumulated on the more overtly political impacts of disasters. While carefully designed and

in-depth case studies would be one way to research the suggested connection between disasters and political instability, we would like at this time to take a more modest and quantitative tack. We are interested in this question: Do disasters, or certain types of disasters, cause political instability? That is, can we determine a relationship, especially statistical, between disasters and political instability? If so, how strong is the relationship, and under what conditions does it vary? Because the connection has been more assumed or asserted than either conceptually developed or empirically tested, this paper describes a pilot effort to develop and test a model linking disasters with political instability.

Suggestive Quantitative Evidence

To start, drawing from the *World Handbook of Political and Social Indicators*, which has data for demonstrations, riots, armed attacks, strikes, and governmental sanctions and executions for most countries from 1964 to 1982, we extracted composite instability graphs for Pakistan/Bangladesh, Nicaragua, Honduras, and Guatemala (Mexico cannot be included because of the database's 1964–1982 time frame). (See Figures 1, 2, 3, and 4.)

Figure 1. Pakistan and Bangladesh

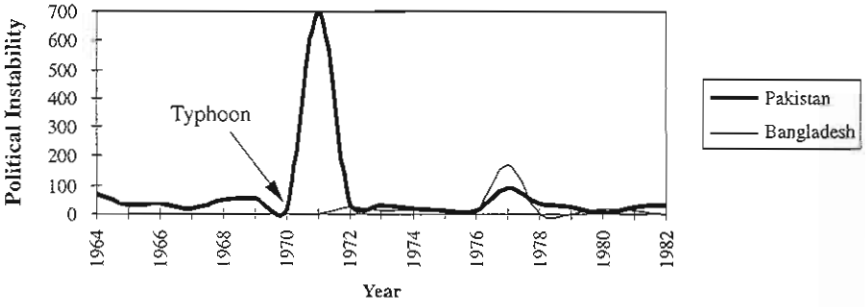
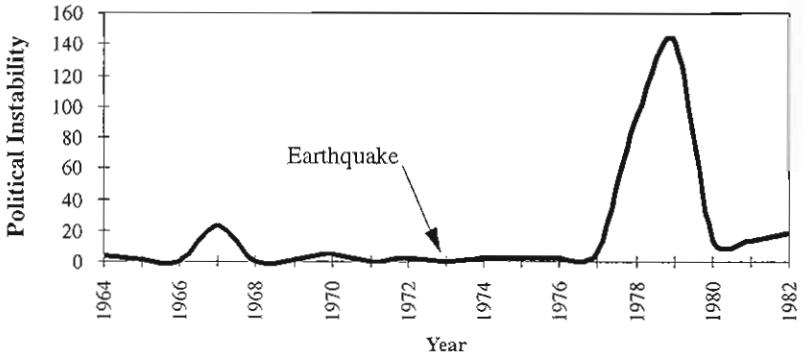


Figure 2. Nicaragua



These data present intriguing matches with the case evidence. Nonetheless, time lags must be considered, as can be seen in the graphs for both Nicaragua and Guatemala, where a kind of three- to five-year "cooking time" between disaster and acute political instability is evident.[4] For Bangladesh and Honduras, however, the disasters show no such time lag, political instability following almost immediately on the heels of disaster. While it is far too early to offer an explanation for these differences in timing, we may be seeing—from a political perspective—two different types of disasters: "catalytic" disasters on one hand, which exacerbate and focus preexisting discontent (see Green 1977, p. 61), and "lagged" disasters on the other hand, which take longer to show their political impacts (Albala-Bertrand 1993, p. 204, makes a very similar point).

Refining the catalytic-lagged distinction still further, we may find that differential timing is a function of regime type. For example, in highly repressive regimes (Nicaragua in 1972 and Guatemala 1976 would clearly qualify, for example), only the most foolish of protesters/challengers engaged in overt political moves against the government without careful preparation; therefore, we may find that the lag time between disaster and

Figure 3. Honduras

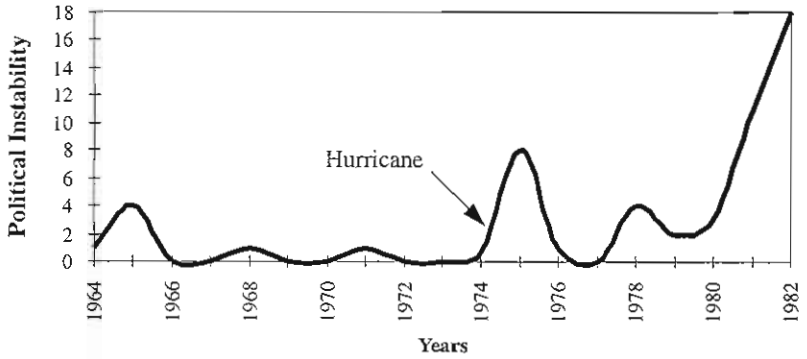
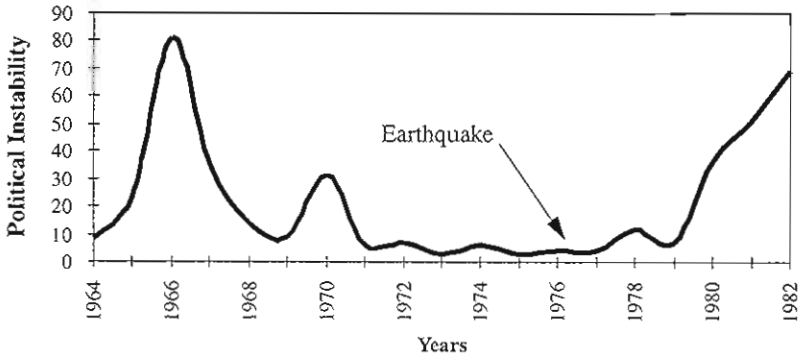


Figure 4. Guatemala



political instability is shorter in less repressive regimes. The Mexican case may be instructive on this point. If we view the 1988 election as an aborted regime change and Mexico as only semi-authoritarian (certainly not in the category of Nicaragua in 1972 and Guatemala in 1976), then the two-plus years between the disaster and the election crisis situate Mexico appropriately (shorter lag than either Nicaragua or Guatemala).

This research has serious theoretical and practical implications. Sources of political instability are a central concern to a vast array of academic literature, but the impact of disasters has never been systematically included as a variable. Nonetheless, every government worries about instability and regime maintenance, and the developed countries worry about broken states and the ensuing need for often complicated and expensive peacekeeping efforts. It would be especially interesting if we find that countries with a certain set of characteristics are more prone to disaster-induced instability than others.

A Disaster-Political Instability Model

It has long been argued (from Mayer 1974, Glantz 1976, and Wiseberg 1976 to Cuny 1983 and Albala-Bertrand 1993) that disasters overload political systems by multiplying societal demands and empowering new groups on one hand, while disarticulating economies and disorganizing governments (as well as revealing their organizational, administrative, and moral deficiencies) on the other. While it is also acknowledged that disasters may strengthen leadership and solidify governments, depending upon their handling of relief and reconstruction, the overwhelming picture is one of system stress and public dissatisfaction with government.

Because disasters are by definition a mismatch between a natural event's impacts and the response resources and efficiency of the affected society, we expect, first, that virtually without exception, no matter how well a government handles a disaster, public dissatisfaction increases. This dissatisfaction may focus on one or more of the disaster phases: pre-event mitigation, post-event emergency response, and/or long-term reconstruction. For example, after the 1972 earthquake disaster, the vast majority of Nicaraguans did not fault the Somoza regime for mitigation failures; they were, however, aghast at the misappropriation of relief and then reconstruction assistance, which was appalling even by Nicaraguan standards. In Mexico City after the 1985 disaster, on the other hand, mass protests broke out over building code violations and corruption in the regulation of construction, especially of public buildings. Therefore we expect a positive relationship between a disaster's severity and subsequent political instability.

Second, we expect an inverse relationship between regime repressiveness and political instability. Our logic is that the more historically repres-

sive a regime, the less the post-disaster political instability, at least in the short term. Simply put, if the government declares martial law or its state of emergency equivalent, it is unlikely that disaffected groups in the society will be able to mount much of a protest following a disaster. Further, those groups will have to deal with the repressive environment, taking time and resources away from their anger over the disaster.

Third, we expect an inverse relationship with level of development. Virtually by definition, wealthier societies have more resources to throw at a disaster, so dissatisfaction will be less intense and less enduring, and therefore disaster-induced political instability should be less.

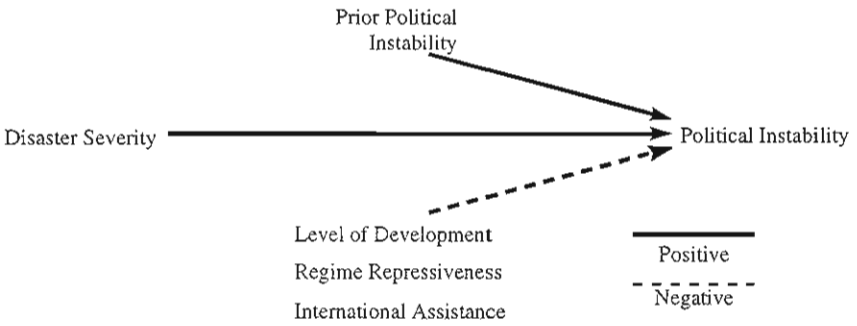
Fourth, we expect an inverse relationship between external (bilateral and international) assistance and political instability for essentially the same reason: resources. The more assistance that flows into a disaster-stricken country, the more resources a regime has to mollify the population, so the less the ensuing instability.

Finally, and to switch out of inverse relationships, we expect that prior political instability will be positively related to post-disaster political instability. Our logic here is based on the argument that the more a society is experiencing instability prior to a disaster, the more prone it is to experience increased instability afterwards. These relationships are modeled in Figure 5.

Measures and Testing

For this pilot study, we selected all nations that had disasters with a death toll of 1,500 or more in the period 1966–1980. The following countries are included in the analysis: Bangladesh, China, Guatemala, Honduras, India, Iran, Nicaragua, Nigeria, Pakistan, Peru, the Philippines, and Turkey.[5] Thus, our data set does not represent all disasters; instead, it represents all major

Figure 5. A Disaster-Political Instability Causal Model



disasters in the 15-year period, at least in absolute terms. For each nation, the time-series begins two years before its first disaster of 1,500 or more casualties and ends seven years after its last disaster of 1,500 or more casualties. The two years before the disaster capture the country's prior instability. The seven years following the disaster is the longest period we reasonably expect disaster-induced unrest. Recall that Nicaragua (Figure 2) did not experience its greatest instability until six years after the disaster.

We assembled the data into a time-series cross section (TSCS). This technique pools (combines) all the selected independent time-series for the various countries into one data set. It has two clear advantages: (1) If the data were only cross-sectional, we would need to select countries randomly into those with disasters and those without; however, because the data are in a time-series, falsification is inherent in the technique; (2) Pooling the 12 countries allows us to test the theoretical model across the countries for greater generalization. In fact, pooled time-series is especially appropriate for disaster research because it models event effects in both space and time, avoiding the tendency to analyze disasters out of their larger contexts, as if they were somehow isolated events.

Unfortunately, TSCS advantages come with certain complexities. In addition to statistical problems facing conventional time-series or cross-section analyses, a TSCS can be affected by heteroskedasticity (nonnormal error distribution) across the dyads. For example, Latin American countries may be more susceptible to instability following a disaster than Asian countries. If this situation were the case, it would affect the analysis by conflating the two types of nations (Latin American and Asian) into one estimation.

The solution for this problem is to create a fixed-effects model that controls for the different countries. A fixed-effects model assumes that variation exists between the countries but not across time. That is, the effect of time is assumed to be constant for each country, and therefore the variation is *between* countries (for a full discussion of the fixed-effects model see Greene 1997, Chapter 14). The process actually enters a dummy variable for each country in the equation,[6] effectively changing the intercept or constant term for that country. Thus, each country in the dataset has its own starting point, allowing for the intercountry differences.

The second problem potentially facing TSCS analysis is time dependence. That is, because time is modeled in the analysis, lag processes or inconsistencies may run through the data. We expect that, in addition to the other effects, prior instability will increase current instability. This problem is solved by modeling the process with a lagged dependent variable. Other time processes may be running through the data, however, which violate

the fixed-effects assumption of constant intercountry variation. We solve this particular problem by using the random-effects TSCS model, which does not assume that the intercountry variation is constant. The result is that each country's intercept term is not constant.[7] In sum, matching the statistical method to the theory, the random-effects method not only expects but also models the differences between countries and across time.

To measure the dependent variable, POLITICAL INSTABILITY, we aggregate demonstrations, riots, armed attacks, and strikes into annual periods. These data come from the Taylor and Jodice (1983) *World Handbook of Political and Social Indicators*.

For the independent variable measuring disaster severity, we aggregate the number of disaster fatalities in a given year for a given country. However, because people remember disasters longer than just in their year of occurrence, we measure this variable such that the deaths caused by a disaster accumulate with those from other disasters over time. People do not have perfect memories, however, so we hold that people gradually forget an event over time, causing both their memories and subsequent anger to ebb. This relationship is modeled below in Equation 1.

$$KILLED_{it} = FATAL_{it-1} + FATAL_{it} \text{-(DECAY RATE)}$$

FATAL represents the number of disaster fatalities. As can be seen in the first portion of the equation ($FATAL_{it-1} + FATAL_{it}$), the number of dead accumulate in the minds of the (surviving) population. The data for FATAL come from the Office for Foreign Disaster Assistance (OFDA) database. The number of dead—the severity of the event—has a psychological effect on the society: The more dead, the greater the grief and anger. While underreporting and overreporting of disaster losses are not uncommon, the officially reported OFDA figures are reliable enough for purposes of cross-national comparison.

The second part of the equation is the unspecified decay factor (DECAY RATE). To specify the decay rate, we stipulate that people forget at 50 percent per annum. We cannot assume, however, that the decay rate will be constant through time and across different cultures. Thus, we model the decay rate so that it is positively related to the level of repressiveness ($repression_{it}$) in the nation for that year.[8] That is, the more repressive a regime, the more quickly the population will "forget" the people killed in a disaster. This relationship is modeled in Equation 2.[9]

$$KILLED_{it} = FATAL_{it-1} + FATAL_{it} \quad (FATAL_{it}(.5+(REPRESSION_{it}/100))$$

Because nations vary in size, the severity of the disaster may vary in its effects. An example may be helpful here. When a hurricane hits the tiny island of Antigua and kills 100, the *relative loss* is extremely high. If an

earthquake strikes China and 100 people die, the effect would be less than trivial. We control for size by including the country's POPULATION for each year as reported by the *UN Statistical Yearbook*.

We measure the development level with the Gross Domestic Product (GDP) as reported in the *UN Statistical Yearbook*. We do not use per-capita GDP because we have already included population in the model.[10] Because the analysis is multivariate, population is controlled for by the individual variable. Including per-capita GDP would be redundant and statistically overspecified.

To capture the amount of post-disaster assistance (AID) flowing to the country from outside sources, we aggregate all of the aid from the US government (including PL 480, more commonly known as "Food for Peace"), international organizations, and voluntary groups. We control for inflation by setting the amounts to 1983 dollars. Finally, to tap the prior instability we simply lag by one year POLITICAL INSTABILITY and call the variable PRIOR INSTABILITY.

In early testing, we noted disparities between the number killed in a disaster and the level of instability. For example, the mean number killed is 4,740 with a standard deviation of 29,948. The mean instability level is 11,738 with a standard deviation of 104,433. Because these values show such range and variance, we took the natural logs of all of the variables. The final model is depicted in Equation 3.

$$LN(POLITICAL\ INSTABILITY_{it}) = + LN(PRIOR\ INSTABILITY_{it}) + LN(KILLED_{it}) - LN(GDP_{it}) + LN(POPULATION_{it}) - LN(AID_{it})$$

When we estimate Equation 3 with a random-effects model, the results are quite impressive (see Table 1).[11] With one exception, the variables are statistically significant, and they all act in the hypothesized manner. The Hausman specification test revealed that the random-effects model was correctly specified.

As expected, PRIOR INSTABILITY has a positive effect on current instability, but the country's GDP has a negative effect. However, the greater the population, the more the instability. These two results must be interpreted in the light of the country's development level. Because we separated GDP and population, population is effectively controlling for the country's development level; thus, it has a negative sign. Therefore, the greater the level of development, the less the ensuing instability.

The most interesting result is the positive sign of KILLED. The more people killed in a disaster, the greater the ensuing political instability. For example, in a country with the mean GDP and POPULATION, a DECAY RATE of 50 percent (equating no repression), no prior instability, and $5,203,211

in aid (the mean), a disaster that kills 1,500 people increases the instability to 2.4 in the first year, 3.0 in the second, and 2.9 in the third. When 25,000 are killed and given the same values, the instability increases to 3.8 the first year, 5.7 the second, and 6.0 the third.

Table 1: Political Instability by Lagged Political Instability, Killed, GDP, & Population

Independent Variables	Coefficient	Standard Error	Significance
PRIOR INSTABILITY	0.3989	0.0574	0.0000
KILLED	0.1658	0.0521	0.0010
GDP	-0.1567	0.0323	0.0000
POPULATION	0.1766	0.0759	0.0200
AID	-0.0186	0.0201	0.3540
Constant	-0.8697	1.3298	0.5130
R-Squared:	Overall = 0.4235		
	Within = 0.2412		
	Between = 0.8895		

The results from KILLED highlights the importance of the decay rate.[12] Recall that the decay rate is positively associated with the level of governmental repression. Our results imply that if a regime increases repression after a disaster, the population will find itself less able to maintain or at least exhibit anger. While this could reflect fear of demonstrating against a repressive regime, it could also be that people actually forget about the disaster more quickly because they have a repressive regime with which to deal on a variety of other issues—diverting their energies and attention.

Disturbingly, these findings suggest that governments actually have an incentive to increase repression after a disaster. We are led to the dismal conclusion that, from the results above, if a government cracks down immediately after a disaster, it can virtually eliminate instability after the first year.[13]

The last variable, AID, while not statistically significant, is in the predicted direction. It indicates that increased aid levels are negatively related to instability. Thus, aid to a disaster-stricken country should decrease instability. However, the variable failing to reach statistical significance means that its effects may be caused by chance. This finding may also prove disturbing to at least some components of the donor community, but we are still in the pilot phase of this project.

It bears emphasizing that almost all of the model's variables are not only statistically and substantively significant, but also accurately explain the data. While several different ways to measure the fit of a TSCS model exist, each emulates the OLS R-squared. They are not calculated in the same manner, however. First, the overall R-squared measures the entire or overall

model. As seen in Table 1, the overall R-squared is a rather strong 0.42, indicating that the model, while not perfect, does a good job of explaining political unrest following a major disaster. The within R-squared represents the within case accuracy of the model. That is, it calculates the model's accuracy for the individual cases, not the entire data set. It is weaker, but still quite good, at 0.24. This lower value indicates that relatively important differences exist between the countries, a finding that should not be surprising considering the diversity of nations in the dataset. Finally, the between R-squared taps the accuracy through time, calculating the model's fit through time alone. It is extremely strong at 0.89.[14] This finding suggests that the model's temporal accuracy is especially strong.

Conclusion

Although from only a pilot study at this time, our findings should lay to final rest any thoughts that disasters are not deeply and intrinsically political events. They also reveal that the political effects of disasters *endure*—they are not just emotional flashes in the political pan. In that sense, we corroborate the case study evidence adduced above. Indeed, Cuny (1983) and Albala-Bertrand (1993) may have been more prescient than they knew at the time. In addition, we are also laying to final rest the notion that the low-conflict altruistic or "therapeutic" community, long a staple finding of disaster research, lasts much beyond the immediate emergency period.

The next and most obvious step for this research program is to extend the dataset to encompass all disasters, not just those of 1,500 or more killed, and expand the period to cover 1964 to the present (a number of very politically interesting disasters occurred in the last 15 years). With this type of enhanced data, we expect to be able to develop profiles of countries prone to disaster-related instability and countries that are not. Further, we would like to study more closely the effects of disasters on stable democracies—that is, disasters in nations where one would not expect to see post-event instability.[15]

Our paper also highlights the crucial cross-fertilization needed between case studies and quantitative analysis, two research genre often thought of as mutually unsympathetic. It bears repeating that case evidence stimulated the model and testing in this paper, and this paper will hopefully stimulate deeper, cross-national case studies of post-disaster politics. Indeed, a separate but obviously necessary task is the development of a model that explains more precisely how disasters affect national-political systems to yield the kinds of instability we have confirmed statistically. That is, it seems inadequate to simply say that disasters generate public dissatisfaction and let it go at that. We need to specify in greater detail the demand stress,

resource constraint, and decisionmaking problems created by disasters and how political systems respond, or fail to respond, to those problems.

We must also mention some weaknesses in this pilot study. First, we are currently unable to control for inequality or what might be called "equity of development" in disaster-stricken countries, a variable that should logically be part of the model. Adding Gini coefficients or other inequality measures to the equation will help fill this hole. Second, the generalizability of our findings is limited because we were restricted to nations that experienced relatively large disasters, which the reader will note also tend to be less developed. Because one would expect more developed countries to be less likely to experience disaster-induced political instability, our sample may be biased. This possible bias, however, should not be too problematic because we controlled for level of development. So, while the sample may be biased, we do control for the factor causing the bias within the sample. Moreover, our selection criteria are a priori, and thus the bias is simply a function of selecting major disasters. As a result, we can say with confidence that for major disasters, our findings hold.

We do believe, however, that our paper's strengths outweigh its weaknesses. First, the analysis is a time-series, boosting confidence that the tests are able to falsify our hypotheses. Second, the data are also in a cross section, so while we do find differences between individual nations, our analysis is still generalizable beyond a single case. Third, as noted, our quantitative analysis is an extension of previous case studies or at least case evidence, so we are not building our model out of thin air. Indeed, our study takes these analyses to the next step by quantitatively testing their significance and providing a platform for further research of various types.

Finally, we must say with all candor that one major policy implication inherent in our findings is disconcerting, at least to us. Disasters do seem to generate an expanded-political space for popular movements and/or regime critics to organize and act. Therefore, they can be seen as democratizing in some respects. Nonetheless, the idea that regimes in post-disaster situations "should" repress their societies in order to forestall subsequent political unrest is an awkward and distasteful conclusion. At this point in our analyses, however, post-disaster martial law or a declared state of emergency—with all of the civil-liberty suspensions attendant thereto—seems a prudent policy for a regime interested in stability and possibly even self-preservation.

Notes

1. Although Green (1977) was primarily interested in political reluctance to issue disaster declarations in famine and other slow-onset events and in political interference with disaster relief, he noted in passing that disasters often caused, or at least triggered, political instability, citing especially Mayer (1974).

2. Disaster research carries with it some dangers; disaster activism even more. In April 1995, Fred Cuny was murdered in Chechnya, along with two colleagues, while conducting a humanitarian-needs assessment in the area. He is missed in many ways.

3. We are aware that political *unrest* does not necessarily equate with *instability* in a strict conceptual sense, but the terms are often used interchangeably for stylistic reasons.

4. Interestingly, Figure 2 for Nicaragua shows the greatest lag of the four cases between disaster and a major increase in political instability, but it is precisely the case for which the literature connecting the two is the strongest. In fact, the literature is unequivocal about the connection.

5. Chad and Romania had to excluded for reasons of missing data.

6. The dummy variables do not appear in the estimation, however.

7. For a discussion see Beck and Tucker (1996) and Greene (1997, pp. 612–647).

8. We measure regime repression by aggregating regime—supported riots, imposition of political sanctions, and political executions from the *World Handbook of Political and Social Indicators*.

9. All values for (.5+(repression$_{jt}$/100)) that exceeded 1 were reduced to 0.99 because it is impossible to have a decay rate greater than 100 percent. Only 13 of 171 cases were reduced.

10. We realize that the nation's level of equality may effect the political instability following a disaster. However, this analysis is only a pilot study. Equity will be included in follow-up research.

11. We used Stata 5.0 (1997) for all the analyses.

12. Because killed is strongly significant as well as an important variable, we can infer that the decay rate is correctly specified.

13. The model predicts some residual instability as a result of the prior instability.

14. Even without prior instability, the between R-squared equals 0.71.

15. This research will require more refined measures of political instability than the ones used here.

References

Albala-Bertrand, J. M. 1993. *The Political Economy of Large Natural Disasters.* Oxford: Clarendon Press.

Anderson, Thomas P. 1988. *Politics in Central America.* New York: Praeger.

Annis, Sheldon. 1991. "Giving Voice to the Poor." Foreign Policy 84 (Fall):93–106.

Bates, Frederick L. (ed.). 1982. *Recovery, Change and Development: A Longitudinal Study of the 1976 Guatemala Earthquake.* Athens, Georgia: University of Georgia Department of Sociology.

Beck, Nathaniel and Richard Tucker. 1996. "Conflict in Space and Time: Time-Series—Cross-Section Analysis with a Binary Dependent Variable." Paper presented at the annual American Political Science Association meeting.

Brinton, Crane. 1938. *Anatomy of Revolution.* Englewood Cliffs, New Jersey: Prentice-Hall.

Brockett, Charles D. 1992. "Measuring Political Violence and Land Inequality in Central America." *American Political Science Review* 86 (March):169–176.

Bulmer-Thomas, Victor. 1991. "Nicaragua Since 1930." Pp. 227–276 in *Central America since Independence*, edited by Leslie Bethell. Cambridge: Cambridge University Press.

Castañeda, Jorge G. 1993. *Utopia Unarmed, The Latin American Left After the Cold War.* New York: Vintage Books.

Cockroft, James D. 1990. "Mexico's Political Earthquake." *Monthly Review* 42 (December):39–50.

Cothran, Dan A. 1994. *Political Stability and Democracy in Mexico: The "Perfect Dictatorship"?* Westport, Connecticut: Praeger.

Cuny, Frederick C. 1983. *Disasters and Development.* Oxford: Oxford University Press.

Davies, James C. 1962. "Toward a Theory of Revolution." *American Sociological Review* 27 (February):5–19.

Davis, Morris and Steven Thomas Seitz. 1982. "Disasters and Governments." *Journal of Conflict Resolution* 26 (September):547–568.

Diamond, Larry. 1991. "Economic Development and Democracy Reconsidered." *American Behavioral Scientist* 35 (March-June):450–499.

Diamond, Larry, Juan J. Linz, and Seymour Martin Lipset. 1990. *Politics in Developing Countries: Comparing Experiences with Democracy.* Boulder, Colorado: Lynne Rienner.

Dixon, William J., Edward N. Muller, and Mitchell A. Seligson. 1993. "Inequality and Political Violence Revisited: Response." American Political Science Review 87 (December):983–993.

Dore, Elizabeth. 1986. "Nicaragua: Experience of the Mixed Economy," Pp. 319–350 in *Latin American Political Economy: Financial Crisis and Political Change*, edited by Jonathan Hartlyn and Samuel A. Morley. Boulder, Colorado: Westview Press.

Drabek, Thomas E. 1986. *Human System Response to Disaster: An Inventory of Sociological Findings.* New York: Springer-Verlag.

Dunkerley, James. 1988. *Power in the Isthmus: A Political History of Modern Central America.* London: Verso.

Dunkerley, James. 1991. "Guatemala Since 1930." Pp. 227–276 in *Central America since Independence*, edited by Leslie Bethell. Cambridge: Cambridge University Press.

Feierabend, Ivo K. and Rosalind L. Feierabend. 1966. "Aggressive Behavior within Polities, 1948–1962: A Cross-National Study." *Journal of Conflict Resolution* 10 (September):249–271.

Feierabend, Ivo K. and Rosalind L. Feierabend. 1972. "Systemic Conditions of Political Aggression: An Application of Frustration-Aggression Theory." Pp. 136–183 in *Anger, Violence, and Politics,* edited by Ivo K. Feierabend, Rosalind L. Feierabend, and Ted Robert Gurr. Englewood Cliffs, New Jersey: Prentice-Hall.

Freudenheim, Ellen, "Politics in International Disasters: Fact, Not Fiction." 1979. Pp. 225–244 in *Disaster Assistance: Appraisal, Reform and New Approaches*, edited by Lynn H. Stephens and Stephen J. Green. New York: New York University Press.

Gasiorowski, Mark J. 1995. "Economic Crisis and Political Regime Change: An Event History Analysis." *American Political Science Review* 89 (December):882–897.

Glantz, Michael H. 1976. *The Politics of Natural Disaster.* New York: Praeger.

Granados, Héctor Rosada, 1992. "Parties, Transitions, and the Political System in Guatemala." Pp. 89–109 in *Political Parties and Democracy in Central America*, edited by Louis W. Goodman, William M. Leogrande, and Johanna Mendelson Forman. Boulder, Colorado: Westview Press.

Green, Stephen. 1977. *International Disaster Relief: Toward a Responsive System.* New York: McGraw Hill.

Greene, William H. 1997. *Econometric Analysis, Third Edition.* Englewood Cliffs, New Jersey: Prentice Hall.

Gurr, Ted Robert. 1968. "A Causal Model of Civil Strife: A Comparative Analysis Using New Indices." American Political Science Review 62 (December):1104–1124.

Gurr, Ted Robert. 1970. *Why Men Rebel.* Princeton, New Jersey: Princeton University Press.

Gurr, Ted Robert. 1974. "Persistence and Change in Political Systems" *American Political Science Review* 68 (December):1482–1504.

Hellman, Judith Adler. 1994. "Mexican Popular Movements, Clientelism, and the Process of Democratization." Latin American Perspectives 21 (Spring):124–142.

Hibbs, Douglas A 1973. *Mass Political Violence: A Cross-National Causal Analysis.* New York: Wiley.

Huntington, Samuel P. 1991. *The Third Wave: Democratization in the late Twentieth Century.* Norman, Oklahoma: University of Oklahoma Press.

Johnson, Chalmers. 1966. *Revolutionary Change.* Boston: Little, Brown.

Kim, C. I. Eugene and Lawrence Ziring. 1977. *An Introduction to Asian Politics.* Englewood Cliffs, New Jersey: Prentice-Hall.

Krauze, Enrique, 1997. *Mexico, Biography of Power: A History of Modern Mexico, 1810–1996.* New York: HarperCollins.

Mayer, Jean. 1974. "Coping with Famine." *Foreign Affairs* 53 (October):98–120.

Midlarsky, Manus I. 1988. "Rulers and Ruled: Patterned Inequality and the Onset of Mass Political Violence." American Political Science Review 82 (June):491–509.

Midlarsky, Manus I. 1989. "Land Inequality and Political Violence (Rejoinder)." *American Political Science Review* 83 (June):587–595.

Muller, Edward N. 1985. "Income Inequality, Regime Repressiveness, and Political Violence." *American Sociological Review* 50 (February):47–61.

Muller, Edward N. and Mitchell A. Seligson. 1987. "Inequality and Insurgency." *American Political Science Review* 81 (June):425–451.

Muller, Edward N., Mitchell A. Seligson and Hung-der Fu. 1989. "Land Inequality and Political Violence (Critique)." *American Political Science Review* 83 (June):577–586.

Perera, Victor. 1993. *Unfinished Conquest: The Guatemalan Tragedy.* Berkeley, California: University of California Press.

Przeworski, Adam. 1991. *Democracy and the Market: Political and Economic Reforms in Eastern Europe and Latin America.* Cambridge: Cambridge University Press.

SAIS (School of Advanced International Studies) Study Group. 1985. *Report on Guatemala.* Baltimore: Johns Hopkins University Press.

Schroeder, Richard C. 1985. "Troubled Mexico." *Editorial Research Reports* (November 8):843–860.

Seitz, Steven Thomas and Morris Davis. 1984. "The Political Matrix of Natural Disasters: Africa and Latin America." *International Journal of Mass Emergencies and Disasters* 2 (August):231–250.

Smith, Peter H. 1991. "Mexico since 1946: Dynamics of an Authoritarian Regime." Pp. 321–396 in *Mexico since Independence*, edited by Leslie Bethell. Cambridge: Cambridge University Press.

StataCorp. 1997. *Stata Statistical Software: Release 5.0.* College Station, Texas: Stata Corporation.

Tangeman, Michael. 1995. *Mexico at the Crossroads, Politics, the Church, and the Poor.* Maryknoll, New York: Orbis Books.

Taylor, Charles Lewis and David A. Jodice. 1983. *World Handbook of Political and Social Indicators,* (3rd ed.) Cambridge, Massachusetts: Yale University Press.

Wang, T. Y. 1993. "Inequality and Political Violence Revisited: Comment." *American Political Science Review* 87 (December):979–983.

Wiseberg, Laurie. 1976. "An International Perspective on the African Famines." Pp. 101–127 in *The Politics of Natural Disaster*, edited by Michael H. Glantz. New York: Praeger.

Woodward, Ralph Lee, Jr. 1985. *Central America, A Nation Divided.* Oxford: Oxford University Press.