Human Rights and the Death Toll from Natural Disasters

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Natural disasters have been a major cause of human suffering. Countries with higher income, lower inequality, lower corruption, and more democratic regimes have been found to experience less casualties from disasters. The expectation of receiving assistance, however, could also play a role in disaster preparedness. In particular, I examine whether governments that are deemed to be human rights violators, which may not expect to receive assistance, experience lower casualties as a result due to greater investment in disaster preparedness. I find that these countries in fact have a higher mortality rate from disasters.

Keywords: natural disasters, disaster relief, human rights
JEL codes: D7, H5, O0, F35

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1. Introduction

Natural disasters, such as earthquakes and windstorms, are exogenous events. The impact of a natural disaster, and in particular the number of casualties, however, is not solely a function of the magnitude of the disaster. Anbarci et al. (2005), Kahn (2005), Keefer et al. (2011), and Kellenberg and Mobarak (2008), for instance, show that higher income countries suffer lower casualties even though they are not affected by a smaller number of disasters than lower income countries. Kahn (2005) also finds that democracies and countries with lower inequalities suffer lower deaths. Anbarci et al. (2005) similarly find that lower inequality reduces the impact of natural disasters, while Escaleras et al. (2007) and Keefer et al. (2011) conclude that corruption raises the mortality from disasters. Toya and Skidmore (2007) find that more developed countries (higher income and educational attainment, greater openness and financial development, and lower government expenditures) suffer less deaths.

Although much work has been done examining the impact these different factors have on disaster mortality due to the incentives they generate for disaster preparedness, the literature has not explored at length the effect of anticipation of aid. Cohen and Werker (2008) develop a model in which they introduce humanitarian aid, finding that it generates a "bailout effect," meaning that if governments know they will receive assistance in the event of a disaster, they will invest less in disaster prevention. In the case of "pariah" states, there could be two possibilities. On the one hand, such countries could invest more in disaster prevention because of an expectation that they will not receive assistance following an international disaster.[1] On the other hand, they could simply report lower deaths. In both cases, the finding would be of a negative relationship between the extent of human rights violations and natural disaster deaths.

[1] Costa (2010) finds that human rights violators are less likely to receive disaster assistance from the US.

In fact, Cohen and Werker (2008) note that in South Africa, the mortality rate from natural disasters rose by 10 percent after the end of Apartheid, while the overall mortality in Africa fell by more than 90 percent over the same period.

To my knowledge, the only empirical study on the effect of aid anticipation on disaster prevention is Raschky and Schwindt (2009). The authors show in a model that the mere anticipation of foreign aid can lead to higher rates of mortality from natural disasters. Examining the effect of aid, measured as total real ODA commitments per capita, on disaster mortality, they find that the expectation of receiving aid does in fact raise the death toll from wind storms, although the results are mixed in the case of floods and earthquakes.

In this paper, I empirically test whether countries that are deemed to be human rights violators (and which hence may not expect to receive assistant) experience less disasters and lower mortality rates from natural disasters. I find that overall, countries with worse human rights records are no less likely to experience a natural disaster, but that they suffer higher casualties than countries with better human rights records.

The paper is divided as follows. Section 2 provides a description of the data, while Section 3 outlines the empirical specification. Section 4 presents the results, while the last section concludes.

2. Data

This section discusses the data used in the analysis. In particular, I describe the different sources used for constructing the dependent variable, the natural disaster dataset, and the various control variables. Summary statistics on all indicators are provided in Table 1.

2.1. Natural Disaster Fatalities

Information on the number of deaths from different natural disasters is taken from the Emergency Disasters Data Base (EM-DAT), which is maintained by the Centre for Research on the Epidemiology of Disasters (CRED) at the Université Catholique de Louvain.[2] Recorded disasters include natural, technological (such as transport accidents), and complex disasters (famines). For the purposes of this paper, I restrict the sample to the ones for which the database has information on magnitude, namely, earthquakes, floods, and windstorms.

Disasters are recorded in the database if at least one of the following criteria is met: (1) 10 or more people reported killed; (2) 10 or more people reported affected; (3) a state of emergency is declared; (4) international assistance is requested.

2.2. Human Rights

I obtain a measure of human rights from the Political Terror Scale (PTS).[3] The PTS is a measure of political violence and terror experienced by a country in a given year. It is concerned strictly with state terror; in other words, actual "violations of physical or personal integrity rights carried out by a state (or its agents)" (Wood and Gibney, 2010). The data used to construct this index are taken from yearly country reports by Amnesty International and from the State Department's Country Reports on Human Rights Practices. An index for each year and each report is provided, and is currently available from 1976-2008.

The index varies between 1 and 5, with higher values denoting poorer human rights. More specifically, level 5 denotes countries in which "terror has expanded to the whole population. The leaders of these societies place no limits on the means or thoroughness with

2 http://www.em-dat.net/
3 See http://www.politicalterrorscale.org/about.php for more information.

which they pursue personal or ideological goals." Level 4 countries are those where "civil and political rights violations have expanded to large numbers of the population. Murders, disappearances, and torture are a common part of life. In spite of its generality, on this level terror affects those who interest themselves in politics or ideas." In Level 3 countries "there is extensive political imprisonment, or a recent history of such imprisonment. Execution or other political murders and brutality may be common. Unlimited detention, with or without a trial, for political views is accepted," while in Level 2 countries "there is a limited amount of imprisonment for nonviolent political activity. However, few persons are affected, torture and beatings are exceptional. Political murder is rare." Finally, Level 1 includes "countries under a secure rule of law, people are not imprisoned for their views, and torture is rare or exceptional. Political murders are extremely rare." Following Besley and Persson (2009), I use the highest of the State Department and Amnesty International scores for each country and year.

An alternative to the PTS dataset is the Cingraneli and Richards CIRI index, which disaggregates physical integrity violations into several categories, then sums them to create an overall index for physical integrity. However, as Reed and Gibney (2010) point out, this index is problematic. For instance, it is not clear that the different categories that make up physical integrity (disappearances, killing, torture, and imprisonment) are equivalent, as assumed. Secondly, it presumes a degree of accuracy that is hard to be obtained—for example, a score of 1 in the torture category means that there were between 1 and 49 instances of torture in a given country, something that is very hard to measure with certainty. There is also no justification provided for these thresholds, or any evidence that population size is taken into account. For these reasons, I chose the PTS scale as the measure of human rights for this paper.

Nevertheless, to check the effect of disaster aid on different measures of human rights, I experimented with estimating the impact of relief on the physical integrity indicator. The index varies from 0 to 8, with higher values denoting greater respect for these rights.

In addition, I also experiment with measuring human rights using the number of purges events, which is taken from Banks' Cross-National Time-Series Data Archive. This variable measures "any systematic elimination by jailing or execution of political opposition within the ranks of the regime or the opposition" (Banks 2008).

2.3. Additional Controls

The level of democracy in the affected country is measured using the Polity2 indicator, which is taken from the Polity IV database.[4] The variable Polity2 is a measure of the quality of democratic institutions, and varies from +10 (strongly democratic) to -10 (strongly autocratic). Kahn (2005) and Keefer et al. (2011) find that democracies have lower death tolls. Cohen and Werker (2008) argue that this is because in democracies governments place a greater weight on social welfare and so will invest more in disaster preparedness.

The log of per capita income is taken from the Penn World Tables. Kahn (2005), Strömberg (2007), Cohen and Werker (2008), and Keefer et al. (2011) all find that richer countries have lower mortality rates from natural disasters. Kellenberg and Mobarak (2008) find that the relationship between income and disaster risk is non-linear, increasing initially before falling in the case of floods, landslides, and windstorms.

I also include the log of population from the World Development Indicators. Cohen and Werker (2008) argue that because smaller countries are less able to smooth disaster relief, they invest more in disaster preparedness and hence experience lower mortality from disasters.

4 See http://www.cidcm.umd.edu/inscr/polity/index.htm.

I further include population density and the percentage of the population living in urban areas, both from the World Development Indicators, as controls.

Cohen and Werker (2008) argue that countries with higher ethnic fragmentation have higher mortality rates, since governments will invest less in disaster prevention in areas that are hostile. Kahn (2005) posits that better institutional quality decreases the number of deaths. When measuring institutional quality using ethnic fragmentation, he finds that it is insignificant in explaining earthquake deaths, but find that in ZINB estimates, countries that are more highly fragmented actually have lower deaths. I obtain a measure of ethnic fractionalization from Alesina et al. (2003).

In some specifications I also include the GINI coefficient, taken from the World Income Inequality Database,[5] to measure inequality and institutional quality. Kahn (2005) and Anbarci et al. (2005) find that countries with greater inequality have higher mortality rates.

Finally, following Kahn (2005), I include the log of land area, latitude, and dummies for Asia, Europe, and America to control for geographic factors.

3. Empirical Specification

My empirical specification seeks to answer two questions. First, I examine whether countries deemed to be human rights violators experience more natural disasters. Second, I explore whether the number of fatalities from natural disasters is smaller for these countries.

3.1. Incidence of Natural Disasters

To analyze whether human rights violators are more likely to experience a natural disaster. This is important because it could be that human rights violators experience more or less

[5] http://www.wider.unu.edu/research/Database/en_GB/database/

deaths simply because they have a higher or lower incidence of disasters. To explore this possibility, I estimate the following equation:

$$Prob\left(disaster_{idt}\right) = f\left(HR_{it}, LogIncome_{it}, LogPop_{it}, Geography_{i}, Trend_{t}\right) \quad (1)$$

where $disaster_{idt}$ takes a value of 1 if disaster *d* occurred in country *i* at time *t*, HR_{it} is the relevant human rights indicator; $LogIncome_{it}$ and $LogPop_{it}$ are the log of per capita income and the log of population, respectively; $Geography_{i}$ are the geographic indicators; and $Trend_{t}$ denotes a time trend.

3.2. Human Rights and Fatalities

To examine the impact of a country's human rights record on the mortality rate from natural disasters, I first concentrate on the case of earthquakes. I estimate the following equation at the country, year, and disaster level:

$$\ln\left(1+deaths_{idt}\right) = \beta_1 HR_{it} + \beta_2 X_{it} + \beta_3 Magnitude_{idt} + Trend_{t} + \varepsilon_{idt} \quad (2)$$

where $\ln\left(1+deaths_{idt}\right)$ is the log of the number of casualties in country *i* for disaster *d* in year t, X_{it} are the control variables, $Magnitude_{idt}$ is the magnitude of the disaster in the Richter scale, and the other variables are as defined above.

Next, I used a balanced panel at the country-year level to estimate the effect of human rights on casualties from earthquakes, floods, landslides, windstorms, and extreme temperature events. Because the total number of deaths from natural disasters is a non-negative count, and due to overdispersion in the data, I estimate a zero-inflated negative binomial (ZINB) model. The ZINB model allows for the fact that zero deaths may be simply due to the fact that the country did not experience a natural disaster in a given year. In other words, it introduces a splitting mechanism, whereby a zero-count model is estimated via logit, with the dependent variable

taking a value of 1 if there were no natural disaster deaths in a given country and year. Following Kahn (2005), I include the number of natural disasters, as well as interactions between the number of disasters and income and population as explanatory variables.

For the non-zero count model, the control variables are the human rights indicator, the number of disasters, income, population, percent urban, population density, land area, latitude, the Polity2 index, ethnic fractionalization, region dummies, and a time trend. In some specifications I also experiment with including the GINI coefficient and year dummies.

4. Results

In this section I discuss the results of the empirical analysis. Tables 1 and 2 present the results examining the relationship between human rights and the likelihood of a natural disaster, while in Table 3, I explore the effect of human rights on earthquake casualties. Table 4 estimates ZINB models for all disasters, while Tables 5-7 provides the results for earthquakes, floods, landslides, wind storms, and extreme temperature events separately.

4.1. Do Human Rights Violators Experience More Natural Disasters?

Tables 1 and 2 examine whether countries with worse human rights records are more likely to experience a natural disaster. In columns 1-3 of Table 1, I find that human rights are insignificant in explaining the likelihood of a natural disaster. However, in columns 4 and 5, the results suggest that country with worse human rights records (measured either by the political terror scale or the physical integrity index) are more likely to experience an earthquake. In the case of floods, human rights play no role in the probability of a disaster.

Table 2 suggests that human rights violators are also more likely to be affected by windstorms, but less likely to experience landslides.

I also find that relative to Africa, Asia and America are more likely to experience a natural disaster. Countries with larger populations and closer to the equator are similarly more likely to be affected by a natural disaster.

4.2. Death Toll from Earthquakes

When examining the death toll from earthquakes in Table 3, I find that in most cases that the worse the human rights record, measured using the political terror scale, the greater the number of deaths. This result could be due to the finding above that these countries also experience more earthquakes.

I further find that the smaller the area and the larger the population, the greater the number of deaths, although these variables become insignificant when I introduce the GINI coefficient, possibly due to the fact that the number of observations dropped by half. As expected, the larger the magnitude of the earthquake, the higher the number of deaths.

4.3. Zero Inflated Negative Binomial

Examining fatality counts using a ZINB model on all natural disasters (earthquakes, floods, landslides, windstorms, and extreme temperature), I find that when human rights is measured using the political terror scale, the worse the human rights record the higher the number of casualties. The same is true when using the physical integrity index as the measure of violations. When I use purges, however, the results suggest that countries that experience more purge events actually have lower mortality rates, although this result becomes insignificant when I introduce the GINI coefficient.

Furthermore, larger populations, smaller land area, lower population density, and closer distance to the equator are all associated with more casualties.

4.3.1. ZINB by Disaster

In Tables 4-7, I examine the effect of human rights on disaster-specific casualties. In Table 5, I use the political terror scale to measure human rights; in Table 6, the indicator is the physical integrity index; and in Table 7 it is purge events.

As in Table 3, I find that in the case of earthquakes and extreme temperature, worse human rights records, measured using the political terror scale or the physical integrity index, are correlated with higher casualties. The same is true for floods and landslides in Table 5, while in Table 6, I find that human rights violators have lower death counts from windstorms. In Table 7, however, I find that purge events are associated with lower casualties from earthquakes, landslides, and extreme temperature events.

5. Conclusion

This paper examined whether countries with poor human rights records have lower mortality rates from natural disasters. Because these countries may be considered "pariah" states, they may invest more in disaster preparedness in the expectation of receiving no disaster aid. On the other hand, these countries may also under report the number of casualties.

The results, however, suggest instead that the worse the human rights record the higher the number of deaths. Although this could be due to these countries simply experiencing more disasters, I find that overall, human rights violators are no more likely to be affected by natural disasters.

References

Alesina, Alberto, Arnaud Devleeschauwer, William Easterly, Sergio Kurlat, and Romain Wacziarg. (2003). "Fractionalization." *Journal of Economic Growth*, 8, 1231-1294.

Anbarci, Nejat, Monica Escaleras and Charles A. Register. (2005). "Earthquake Fatalities: The Interaction of Nature and Political Economy." *Journal of Public Economics,* 89, 1907-1933.

Banks, Arthur. (2008). "Cross-National Time-Series Data Archive User's Manual."

Besley, Timothy and Torsten Persson. (2009). Repression or Civil War?" *American Economic Review Papers and Proceedings*, 99(2), 292–97.

Cohen, Charles, and Eric D. Werker. "The Political Economy of 'Natural' Disasters." *Journal of Conflict Resolution* 52, no. 6 (December 2008): 795-819.

Costa, Samia. (2010). "Do Countries with Poor Human Rights Records Receive Less Disaster Relief?" working paper.

Escaleras, Monica, Nejat Anbarci and Charles Register. (2007). "Public sector corruption and major earthquakes: A potentially deadly interaction," *Public Choice*, 132(1), 209-230.

Kahn, Matthew. (2005). "The Death Toll from Natural Disasters: The Role of Income, Geography, and Institutions." *Review of Economics and Statistics*, 87(2), 271-284.

Keefer, Philip, Eric Neumayer and Thomas Plümper. (2011). "Earthquake Propensity and the Politics of Mortality Prevention." *World Development*, 39(9), 1530-1541.

Kellenberg, Derek K. and Ahmed Mushfiq Mobarak. (2008). "Does rising income increase or decrease damage risk from natural disasters?" *Journal of Urban Economics*, 63, 788–802

Raschky, Paul A. and Manijeh Schwindt. (2009). "Aid, Natural Disasters and the Samaritan's Dilemma." World Bank Policy Research Working Paper 4952.

Strömberg, David. (2007). "Natural Disasters, Economic Development, and Humanitarian Aid." *Journal of Economic Perspectives*, 21(3), 199-222.

Toya, Hideki and Mark Skidmore. (2007). "Economic Development and the Impact of Natural Disasters." *Economic Letters*, 94, 20-25.

Wood, Reed M. and Mark Gibney. (2010). "The Political Terror Scale (PTS): A Re-introduction and a Comparison to CIRI." *Human Rights Quarterly*, 32(2), 367-400.

Table 1: Human Rights and the Likelihood of Natural Disasters

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
		All			**Earthquakes**			**Floods**	
	PTS	**PhysInt**	**Purges**	**PTS**	**PhysInt**	**Purges**	**PTS**	**PhysInt**	**Purges**
Human Rights	-0.018	-0.010	-0.136	0.118**	0.092***	0.093	-0.008	-0.014	-0.121
	(0.040)	(0.021)	(0.182)	(0.057)	(0.032)	(0.154)	(0.042)	(0.021)	(0.121)
Log GDP per capita	-0.005	-0.009	-0.000	0.086	0.096	0.046	-0.119**	-0.141***	-0.120**
	(0.058)	(0.057)	(0.056)	(0.089)	(0.087)	(0.084)	(0.056)	(0.055)	(0.055)
Log Population	0.526***	0.534***	0.523***	0.345***	0.317***	0.369***	0.368***	0.390***	0.374***
	(0.051)	(0.052)	(0.048)	(0.082)	(0.085)	(0.080)	(0.041)	(0.042)	(0.041)
Log Area	0.044	0.041	0.042	0.021	0.023	0.027	0.062*	0.055*	0.056*
	(0.037)	(0.039)	(0.037)	(0.056)	(0.057)	(0.056)	(0.032)	(0.033)	(0.033)
Latitude	-1.064**	-0.997**	-1.055**	-0.285	-0.348	-0.291	-0.840**	-0.866**	-0.843**
	(0.478)	(0.487)	(0.470)	(0.777)	(0.771)	(0.783)	(0.410)	(0.406)	(0.409)
Trend	0.032***	0.030***	0.031***	-0.012**	-0.013**	-0.011*	0.045***	0.043***	0.043***
	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.005)	(0.005)	(0.005)
Asia	0.506**	0.535**	0.510**	0.272	0.264	0.230	0.703***	0.708***	0.698***
	(0.208)	(0.208)	(0.203)	(0.297)	(0.296)	(0.302)	(0.122)	(0.121)	(0.120)
Europe	0.305*	0.306*	0.322*	0.288	0.373	0.166	0.423**	0.450**	0.430**
	(0.170)	(0.179)	(0.166)	(0.355)	(0.330)	(0.378)	(0.190)	(0.198)	(0.191)
America	0.618***	0.632***	0.624***	0.388*	0.390*	0.367*	0.663***	0.682***	0.670***
	(0.106)	(0.108)	(0.106)	(0.207)	(0.201)	(0.217)	(0.100)	(0.100)	(0.100)
Observations	2,982	2,897	2,989	2,982	2,897	2,989	2,982	2,897	2,989
Pseudo R-Squared	0.2337	0.2306	0.2320	0.1910	0.1925	0.1854	0.2059	0.2059	0.2053
Log Likelihood	-1465.939	-1419.425	-1471.894	-753.218	-737.681	-760.791	-1577.325	-1536.342	-1580.560

Note: Probit regressions. Dependent variable equals 1 if a country experienced a natural disaster in a given year. Robust standard errors clustered by country in parenthesis. *** denotes significance at the 1% level; ** at the 5% level; and * at the 10% level.

Table 2: Human Rights and the Likelihood of Natural Disasters

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Landslides			**Wind Storms**			**Extreme Temperature**		
	PTS	**PhysInt**	**Purges**	**PTS**	**PhysInt**	**Purges**	**PTS**	**PhysInt**	**Purges**
Human Rights	-0.174***	-0.074***	-0.090	0.222***	0.085***	-0.065	0.112*	0.009	-0.269
	(0.059)	(0.026)	(0.136)	(0.057)	(0.028)	(0.142)	(0.062)	(0.032)	(0.381)
Log GDP per capita	-0.001	0.017	0.056	-0.048	-0.080	-0.139	0.010	-0.029	-0.050
	(0.086)	(0.089)	(0.087)	(0.087)	(0.088)	(0.091)	(0.091)	(0.102)	(0.095)
Log Population	0.414***	0.404***	0.351***	0.281***	0.274***	0.327***	0.460***	0.486***	0.480***
	(0.075)	(0.078)	(0.075)	(0.070)	(0.072)	(0.066)	(0.093)	(0.094)	(0.090)
Log Area	-0.094	-0.082	-0.081	0.061	0.073	0.066	-0.129*	-0.126*	-0.120*
	(0.066)	(0.069)	(0.067)	(0.054)	(0.055)	(0.055)	(0.074)	(0.073)	(0.071)
Latitude	1.346*	1.399*	1.373*	-0.988*	-1.058*	-1.059*	2.767***	2.799***	2.732***
	(0.766)	(0.789)	(0.780)	(0.591)	(0.603)	(0.643)	(0.785)	(0.796)	(0.769)
Trend	0.018***	0.018***	0.017***	-0.003	-0.003	-0.000	0.047***	0.052***	0.050***
	(0.005)	(0.005)	(0.005)	(0.007)	(0.007)	(0.007)	(0.009)	(0.009)	(0.009)
Asia	0.806***	0.865***	0.865***	0.898***	0.842***	0.865***	0.186	0.148	0.155
	(0.213)	(0.212)	(0.213)	(0.199)	(0.204)	(0.213)	(0.253)	(0.262)	(0.256)
Europe	-0.125	-0.120	0.013	0.897***	0.837**	0.737*	0.187	0.095	0.096
	(0.249)	(0.263)	(0.256)	(0.341)	(0.355)	(0.398)	(0.266)	(0.277)	(0.265)
America	0.786***	0.794***	0.796***	0.706***	0.690***	0.722***	0.757***	0.737***	0.722***
	(0.162)	(0.169)	(0.165)	(0.205)	(0.211)	(0.230)	(0.228)	(0.231)	(0.229)
Observations	2,982	2,897	2,989	2,982	2,897	2,989	2,982	2,897	2,989
Pseudo R-Squared	0.1983	0.1936	0.1869	0.2552	0.2498	0.2431	0.2654	0.2639	0.2617
Log Likelihood	-1229.542	-1219.274	-1253.722	-592.258	-587.798	-600.454	-609.685	-609.136	-618.553

Note: Probit regressions. Dependent variable equals 1 if a country experienced a natural disaster in a given year. Robust standard errors clustered by country in parenthesis. *** denotes significance at the 1% level; ** at the 5% level; and * at the 10% level

Table 3: Political Terror Scale and the Death Toll from Earthquakes

	(1)	(2)	(3)	(4)	(5)	(6)
Human Rights	0.251	0.334*	0.303**	0.408**	0.447**	0.804
	(0.179)	(0.190)	(0.147)	(0.194)	(0.196)	(0.497)
Log GDP per capita	-0.213	-0.202	-0.014	0.214	0.353	0.457
	(0.278)	(0.336)	(0.302)	(0.368)	(0.478)	(1.648)
Pop density	-0.001	-0.001	-0.000	-0.000	0.002	-0.001
	(0.002)	(0.002)	(0.001)	(0.001)	(0.005)	(0.005)
% Urban	0.014	0.023	0.000	0.002	-0.050*	-0.074
	(0.014)	(0.018)	(0.015)	(0.020)	(0.026)	(0.064)
Log population	0.360*	0.661***	0.370	0.604**	0.366	1.186
	(0.210)	(0.219)	(0.253)	(0.280)	(0.621)	(1.067)
Ethnic Fractionalization	1.220*	1.038	1.221*	0.968	0.572	0.724
	(0.610)	(0.769)	(0.615)	(0.824)	(1.278)	(2.291)
Democracy	0.033	0.004	0.005	-0.028	0.052	0.026
	(0.036)	(0.040)	(0.030)	(0.032)	(0.039)	(0.087)
Log Area	-0.400*	-0.706**	-0.456*	-0.685**	-0.361	-1.232
	(0.212)	(0.278)	(0.246)	(0.288)	(0.611)	(1.133)
Latitude	0.752	0.529	2.249*	2.050	2.309	5.238
	(1.005)	(1.079)	(1.310)	(1.387)	(2.984)	(3.615)
Asia	-0.070	0.675	-0.744	0.000	-1.873	-7.021
	(0.463)	(1.451)	(0.563)	(0.000)	(1.119)	(4.156)
Europe	-0.442	0.902	-1.022**	0.000	-0.418	0.000
	(0.364)	(1.595)	(0.393)	(0.000)	(0.629)	(0.000)
America	-0.631*	0.680	-0.604	0.000	-0.351	0.000
	(0.364)	(1.724)	(0.492)	(1.550)	(0.829)	(0.000)
Trend			0.016	-0.045	0.097	-0.130
			(0.042)	(0.090)	(0.072)	(0.239)
Magnitude			1.204***	1.362***	1.036***	1.405***
			(0.232)	(0.229)	(0.252)	(0.389)
GINI					0.003	-0.025
					(0.029)	(0.073)
Year*Region FE	No	Yes	No	Yes	No	Yes
Observations	314	314	305	305	151	151
Adjusted R2	0.1135	0.3076	0.2556	0.4478	0.3513	0.6307
Log Likelihood	0.0090	0.0324	0.1618	0.2156	0.1684	0.2614

Notes: Dependent variable is the number killed. Robust standard errors clustered by country in parenthesis. *** denotes significance at the 1% level; ** at the 5% level; and * at the 10% level.

Table 4: ZINB Estimation, All Disasters

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	PTS			**Phyint**			**Purges**		
Human Rights	0.519***	0.843***	0.375**	0.212**	0.294***	0.047	-0.252**	-0.596	-0.448
	(0.164)	(0.180)	(0.164)	(0.086)	(0.097)	(0.086)	(0.099)	(0.476)	(0.481)
# disasters	0.027	-0.017	0.008	0.006	-0.028	0.006	0.025	-0.026	0.009
	(0.038)	(0.018)	(0.026)	(0.036)	(0.017)	(0.028)	(0.042)	(0.026)	(0.031)
Log GDP per capita	-0.092	-0.313	-0.613**	0.321	-0.412	-0.802***	-0.258	-0.477	-0.823***
	(0.335)	(0.341)	(0.284)	(0.308)	(0.391)	(0.275)	(0.349)	(0.499)	(0.294)
GINI		-0.040*	0.002		-0.017	0.014		-0.018	0.014
		(0.022)	(0.018)		(0.024)	(0.018)		(0.033)	(0.019)
% Urban	0.014	0.005	0.007	-0.004	0.005	0.009	0.016	0.006	0.010
	(0.015)	(0.015)	(0.011)	(0.014)	(0.016)	(0.011)	(0.014)	(0.018)	(0.011)
Pop Density	-0.001	-0.002***	-0.001	0.000	-0.002***	-0.001*	-0.001	-0.002**	-0.001**
	(0.001)	(0.000)	(0.001)	(0.001)	(0.000)	(0.001)	(0.002)	(0.001)	(0.001)
Log population	0.941***	1.254***	1.100***	0.995***	1.436***	1.184***	1.074***	1.636***	1.210***
	(0.176)	(0.175)	(0.170)	(0.157)	(0.175)	(0.173)	(0.231)	(0.243)	(0.173)
Log Area	-0.401**	-0.582***	-0.352***	-0.377**	-0.681***	-0.341***	-0.385*	-0.639***	-0.337***
	(0.171)	(0.103)	(0.103)	(0.153)	(0.125)	(0.110)	(0.231)	(0.171)	(0.111)
Latitude	2.833	-4.620***	-2.785**	3.321*	-4.078***	-2.576*	2.852	-4.221**	-2.441*
	(1.890)	(1.367)	(1.351)	(1.703)	(1.539)	(1.405)	(1.923)	(1.918)	(1.409)
Trend	-0.013	0.088***	0.048	-0.008	0.098***	0.062	-0.019	0.101***	0.056
	(0.025)	(0.030)	(0.051)	(0.024)	(0.033)	(0.056)	(0.027)	(0.038)	(0.055)
Democracy	0.018	-0.022	-0.007	0.020	-0.008	-0.008	0.006	-0.028	-0.013
	(0.025)	(0.033)	(0.026)	(0.024)	(0.033)	(0.027)	(0.026)	(0.036)	(0.027)
Ethnic Fractionalization	-0.958	-0.958	-0.379	-0.664	-0.380	-0.300	-0.795	-0.345	-0.378
	(0.868)	(0.665)	(0.426)	(0.797)	(0.668)	(0.436)	(0.897)	(0.825)	(0.466)
Asia	0.386	0.516	1.013**	0.383	0.360	1.006*	0.325	0.174	1.065*
	(0.501)	(0.582)	(0.505)	(0.436)	(0.632)	(0.538)	(0.537)	(0.831)	(0.552)
Europe	-0.868	1.691**	1.253**	-1.174	1.484*	1.055	-1.086	0.797	0.911
	(0.855)	(0.759)	(0.621)	(0.758)	(0.847)	(0.666)	(0.855)	(0.959)	(0.594)
America	0.757	1.874***	1.232***	1.318**	1.654***	1.062***	0.867	1.373**	1.044***
	(0.569)	(0.399)	(0.331)	(0.571)	(0.451)	(0.362)	(0.603)	(0.667)	(0.367)

ZINB									
# Disasters	-8.506***	-6.869***	-6.510***	-8.241***	-6.804***	-6.424***	-8.216***	-6.810***	-6.366***
	(2.445)	(0.998)	(1.000)	(2.383)	(1.102)	(0.952)	(2.456)	(1.161)	(0.987)
Log Population *# Disaster	0.351**	0.316***	0.300***	0.334**	0.311***	0.296***	0.334**	0.311***	0.293***
	(0.160)	(0.052)	(0.049)	(0.153)	(0.061)	(0.047)	(0.160)	(0.065)	(0.049)
Log GDP per capita*#Disasters	0.000	-0.000*	-0.000*	0.000	-0.000	-0.000*	0.000	-0.000	-0.000*
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Constant	17.968	-182.435***	-99.387	5.834	-201.383***	-127.321	31.489	-209.767***	-116.089
	(49.924)	(61.298)	(101.934)	(48.763)	(68.171)	(111.205)	(53.624)	(76.914)	(109.406)
Alpha	3.102***	2.348***	2.379***	3.016***	2.294***	2.309***	3.055***	2.280***	2.302***
	(0.243)	(0.225)	(0.229)	(0.233)	(0.224)	(0.226)	(0.236)	(0.230)	(0.226)
Log alpha	1.505***	1.300***	1.018***	1.479***	1.349***	1.043***	1.530***	1.384***	1.046***
	(0.031)	(0.033)	(0.038)	(0.031)	(0.034)	(0.038)	(0.031)	(0.037)	(0.039)
Year dummies?	No	No	Yes	No	No	Yes	No	No	Yes
Observations	2,892	1,088	1,088	2,834	1,106	1,106	2,906	1,111	1,111
Zero obs	1636	552	552	1589	566	566	1647	570	570
Log Likelihood	-8251.671	-3504.181	-3408.889	-8166.152	-3555.443	-3448.866	-8309.511	-3575.804	-3458.020

Notes: Dependent variable is the number killed. Robust standard errors clustered by country in parenthesis. *** denotes significance at the 1% level; ** at the 5% level; and * at the 10% level.

Table 5: Political Terror Scale and Disaster Casualties, ZINB Specification

	(1)	(2)	(3)	(4)	(5)
	Earthquake	**Floods**	**Slides**	**Storms**	**Temperature**
Human Rights	0.476***	0.266**	0.351***	-0.214	0.505**
	(0.140)	(0.107)	(0.086)	(0.242)	(0.212)
Number disasters	7.441***	1.310***	7.002***	2.739	9.993***
	(0.820)	(0.391)	(0.616)	(3.263)	(0.585)
Log GDP per capita	-0.195	-0.592***	0.089	-0.168	1.000**
	(0.383)	(0.213)	(0.145)	(0.326)	(0.420)
% Urban	-0.001	0.012	-0.002	-0.028*	0.002
	(0.019)	(0.011)	(0.006)	(0.016)	(0.018)
Pop Density	-0.003	-0.001	-0.002*	0.001	-0.001
	(0.003)	(0.000)	(0.001)	(0.006)	(0.001)
Log population	0.694***	0.332***	0.011	-0.035	1.058***
	(0.230)	(0.106)	(0.098)	(0.548)	(0.232)
Log Area	-0.112	-0.169*	-0.087	-0.051	-0.709***
	(0.187)	(0.090)	(0.100)	(0.402)	(0.200)
Latitude	4.185***	0.752	0.895	3.651*	-4.935**
	(1.606)	(1.074)	(0.719)	(2.183)	(2.053)
Trend	0.080***	-0.050***	-0.029*	-0.041*	0.032
	(0.030)	(0.015)	(0.016)	(0.024)	(0.025)
Democracy	-0.025	0.006	0.012	0.025	0.054
	(0.037)	(0.021)	(0.016)	(0.039)	(0.037)
Ethnic Fractionalization	0.217	-0.874**	-0.125	-1.237	0.119
	(1.240)	(0.445)	(0.355)	(1.113)	(0.812)
Asia	1.865***	0.935***	0.808***	0.925	-0.018
	(0.677)	(0.361)	(0.253)	(0.587)	(0.663)
Europe	-0.604	-1.294***	0.110	-1.532*	2.034**
	(0.628)	(0.445)	(0.310)	(0.823)	(1.030)
America	1.209*	0.563*	0.457*	2.600***	-0.563
	(0.694)	(0.319)	(0.258)	(0.630)	(0.816)
ZINB					
Number disasters	-14.046***	-15.718***	-7.365***	-14.003***	-0.427***
	(1.236)	(0.481)	(2.399)	(2.097)	(0.129)
Constant	-176.572***	102.420***	52.805	84.397	-88.115*
	(59.498)	(29.354)	(32.250)	(53.973)	(48.905)
Alpha	7.431***	15.936***	5.390***	13.687***	-15.593***
	(0.587)	(0.264)	(0.566)	(1.261)	(0.597)
Log alpha	2.527***	1.593***	1.489***	2.295***	1.667***
	(0.025)	(0.031)	(0.038)	(0.279)	(0.022)
Observations	2,892	2,892	2,892	2,892	2,892
Zero obs	2680	2033	2684	2386	2693
Log Likelihood	-1419.4966	-5350.4175	-1346.8002	-3416.6274	-1337.7007

Notes: Dependent variable is the number killed. Robust standard errors clustered by country in parenthesis. *** denotes significance at the 1% level; ** at the 5% level; and * at the 10% level.

Table 6: Physical Integrity Index and Disaster Casualties, ZINB Specification

	(1)	(2)	(3)	(4)	(5)
	Earthquake	**Floods**	**Slides**	**Storms**	**Temperature**
Human Rights	0.268***	0.056	0.075	-0.254**	0.287***
	(0.098)	(0.050)	(0.047)	(0.129)	(0.100)
Number disasters	7.435***	1.240***	7.090***	2.631	9.984***
	(0.807)	(0.392)	(0.604)	(2.975)	(0.549)
Log GDP per capita	-0.264	-0.530**	0.002	-0.336	0.908**
	(0.418)	(0.223)	(0.157)	(0.356)	(0.391)
% Urban	-0.001	0.006	-0.001	-0.025*	-0.000
	(0.019)	(0.011)	(0.007)	(0.014)	(0.016)
Pop Density	-0.003	-0.001*	-0.003**	0.001	-0.001
	(0.002)	(0.001)	(0.001)	(0.004)	(0.000)
Log population	0.645***	0.427***	0.068	0.176	0.941***
	(0.236)	(0.113)	(0.106)	(0.411)	(0.211)
Log Area	-0.170	-0.165*	-0.099	-0.096	-0.620***
	(0.183)	(0.094)	(0.102)	(0.345)	(0.161)
Latitude	4.687***	1.036	1.105	4.504**	-4.432**
	(1.641)	(1.128)	(0.791)	(2.136)	(1.931)
Trend	0.080**	-0.041**	-0.027*	-0.047*	0.029
	(0.031)	(0.016)	(0.016)	(0.028)	(0.022)
Democracy	-0.018	0.002	0.011	0.017	0.082**
	(0.036)	(0.024)	(0.017)	(0.039)	(0.042)
Ethnic Fractionalization	0.108	-0.981*	-0.148	-1.127	0.417
	(1.250)	(0.500)	(0.382)	(1.101)	(0.708)
Asia	1.627**	0.758**	0.711***	0.908*	-0.374
	(0.688)	(0.370)	(0.267)	(0.548)	(0.638)
Europe	-0.672	-1.659***	-0.225	-1.990**	1.979**
	(0.604)	(0.470)	(0.350)	(0.888)	(0.930)
America	1.115	0.729**	0.423	2.621***	-1.004
	(0.693)	(0.359)	(0.274)	(0.619)	(0.784)
ZINB					
Number disasters	-172.661***	82.101**	50.297	95.676	-80.059*
	(61.480)	(32.262)	(33.004)	(60.516)	(43.228)
Constant	7.721***	16.272***	5.216***	13.553***	-14.338***
	(0.586)	(0.325)	(0.521)	(1.172)	(1.335)
Alpha	2.537***	1.586***	1.517***	2.271***	1.670***
	(0.025)	(0.031)	(0.035)	(0.255)	(0.021)
Log alpha	-172.661***	82.101**	50.297	95.676	-80.059*
	(61.480)	(32.262)	(33.004)	(60.516)	(43.228)
Observations	2,834	2,834	2,834	2,834	2,834
Zero obs	2626	1990	2627	2325	2633
Log Likelihood	-1391.1688	-5253.1806	-1344.9556	-3421.0663	-1357.8846

Notes: Dependent variable is the number killed. Robust standard errors clustered by country in parenthesis. *** denotes significance at the 1% level; ** at the 5% level; and * at the 10% level.

Table 7: Purge Events and Disaster Casualties, ZINB Specification

	(1)	(2)	(3)	(4)	(5)
	Earthquake	**Floods**	**Slides**	**Storms**	**Temperature**
Human Rights	-2.024*	0.171	-0.509***	-0.835	-20.598***
	(1.119)	(0.161)	(0.149)	(0.660)	(1.367)
Number disasters	7.575***	1.284***	7.122***	2.892	10.164***
	(0.800)	(0.389)	(0.646)	(3.348)	(0.602)
Log GDP per capita	-0.606*	-0.662***	-0.077	-0.040	0.869*
	(0.357)	(0.225)	(0.139)	(0.280)	(0.461)
% Urban	0.012	0.012	-0.000	-0.030	-0.002
	(0.019)	(0.011)	(0.007)	(0.019)	(0.020)
Pop Density	-0.004	-0.001*	-0.003**	0.001	-0.001
	(0.002)	(0.001)	(0.001)	(0.006)	(0.001)
Log pop	0.954***	0.414***	0.125	-0.111	1.116***
	(0.210)	(0.112)	(0.100)	(0.660)	(0.237)
Log Area	-0.229	-0.172*	-0.122	-0.052	-0.609***
	(0.173)	(0.098)	(0.104)	(0.406)	(0.199)
Latitude	4.261**	0.992	1.287	3.361*	-5.203**
	(1.668)	(1.129)	(0.873)	(1.929)	(2.150)
Trend	0.063**	-0.044***	-0.026	-0.043	0.031
	(0.031)	(0.016)	(0.017)	(0.027)	(0.025)
Democracy	-0.028	-0.001	0.006	0.028	0.036
	(0.033)	(0.023)	(0.017)	(0.042)	(0.040)
Ethnic Fractionalization	0.526	-0.871*	-0.144	-1.199	0.510
	(1.313)	(0.517)	(0.408)	(1.057)	(0.851)
Asia	1.786***	0.800**	0.770***	0.992*	-0.180
	(0.631)	(0.377)	(0.276)	(0.592)	(0.698)
Europe	-0.722	-1.717***	-0.332	-1.352*	1.808*
	(0.586)	(0.487)	(0.408)	(0.747)	(1.062)
America	1.165*	0.614*	0.499*	2.503***	-0.899
	(0.690)	(0.348)	(0.281)	(0.609)	(0.997)
ZINB					
Number disasters	-141.443**	90.240***	47.159	89.116	-85.064*
	(62.712)	(31.379)	(35.231)	(61.400)	(50.167)
Constant	7.631***	15.210***	5.800***	13.573***	-13.625***
	(0.598)	(0.292)	(0.684)	(1.642)	(1.477)
Alpha	2.543***	1.607***	1.519***	2.303***	1.664***
	(0.025)	(0.031)	(0.042)	(0.304)	(0.022)
Log alpha	-141.443**	90.240***	47.159	89.116	-85.064*
	(62.712)	(31.379)	(35.231)	(61.400)	(50.167)
Observations	2,906	2,906	2,906	2,906	2,906
Zero obs	2694	2050	2699	2396	2705
Log Likelihood	-1422.3387	-5347.4798	-1344.5432	-3436.9606	-1356.4772

Notes: Dependent variable is the number killed. Robust standard errors clustered by country in parenthesis. *** denotes significance at the 1% level; ** at the 5% level; and * at the 10% level.