Governing Disaster: Political Institution, Social Inequality and Human Vulnerability

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Abstract

The paper argues that state capacity and regime type, two fundamental elements of modern political institution, shaped the allocation of disaster vulnerability in the global human community. Four catastrophic earthquakes happened in Japan, India, China and Haiti during the last two decades are the major cases used to demonstrate how the state capacity and regime type influenced human vulnerability. A panel data that includes 150 countries from 1995 to 2009 are used to illustrate the relationship between state capacity, democracy, social inequality and the impact of disaster. After controlling density and continuity of disaster hazards, economic development and dependency ratio, the empirical finding shows that the "political vulnerability," i.e., weaker state and non-democratic regime, are significantly associated with the higher disaster death and victim tolls. It also suggests that, across the political differences, income inequality is the most common factor amplifying the disaster mortality and affected population.

Keywords: disaster, state capacity, democracy, institution, vulnerability, social inequality, mortality, development

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"Tyranny is fiercer than a tiger," said Chinese philosopher Confucius about 2,500 years ago, showing that people had noticed the complicated connections between political institution and the "tiger"—a metaphor for natural hazard. In the new millennium, again, some catastrophic disasters continue to remind us the relationship between fragile political institution and human vulnerability. For example, the 2004 Indian Ocean Earthquake/tsunami and the 2010 Haiti Earthquake revealed that, without a sustainable state and a representative regime, developing countries could hardly survive, prevent the people from physical harm, and recover from the post-disaster economic depression (Burkle 2006; Bayard 2010).

The impact of political institution has usually been mentioned in the disaster literatures (Mileti 1999; Hass, Kates and Bowden 1977; Keefer, Neumayer and Plümper 2010), but the analytical framework of the relationship between political institution and human vulnerability is still underdeveloped. In this article, I argue that state capacity and regime type, two fundamental elements of modern political institution, shape the distribution of disaster hazard in the global human community. A comparison of four large-scale earthquakes in Japan, India, China and Haiti is

applied to express the political mechanisms derived from state capacity and regime type and how it influenced human vulnerability. A panel data from 1995 to 2009, which includes 155 countries, are used to illustrate the relationship between political institution and disaster affected population. After controlling economic development, dependency ratio and income inequality as indicators of social vulnerability, the regression results show that weaker state and non-democratic regime are significantly associated with the greater percentage of disaster victims and sufferers. The "political vulnerability" shall be taken into account in the policy-making process of international and multilateral disaster relief actions.

1. Political Institution and Disaster

The relationship between political institution and the impact of disaster is an underestimated issue in the sociological studies of disaster (Hewitt 1998; Quarantelli 1998; Stalling 2002; Freudenburg, Gramling, Laska and Erikson 2009). In disaster literatures, indeed, some scholars have taken political factors as a component of social vulnerability in their geographical indexes (Brooks, Adger and Kelly 2005; Cutter 1996; Cutter et al. 2003). Also, sociologists and anthropologists who study disasters claimed that political economy matters in the process of preparedness and

post-impact responses (Jones and Murphy 2009; Oliver-Smith 1996; Wisner et al. 2004). More than a few recognized that in the post-disaster relief, social inequality and political entitlement would affect human vulnerability through resource distribution and service delivery (Sen 1981, 1999). Instead of aiming at the political institution itself, most sociological studies turned to investigate the supportive role of civil society before and after disasters (Aldrich and Crook 2008; Ö zerdem and Jacoby 2006). In a time when people have become more aware of natural hazard, we shall bring the political institution back into disaster analysis.

Recently, some economists and political scientists have noticed the statistical association between politics and disaster fatality (Keefer, Neumayer and Plümper 2010); In contrast to sociologists' favor of state and society, their studies focus on the leaderships' rational choices to—or not to—provide public goods for preventing casualties from disasters. A prior study of Kahn (2005) found that democracy could help reducing disaster fatality and explains the finding with the political incentive of democratic leaders, who may commit offering public goods for mitigation under competitive elections; Anbarci, Escaleras and Register (2005), on the other hand, found that disaster mortality rises with inequality and with corruption (Escaleras, Anbarci, and Register 2007). Moreover, Keefer et al. (2010) noticed that "both democracies and non-democracies exhibit considerable heterogeneity", instead of

measuring the variety of state building, they argued that if a democracy or an autocracy remains in power longer, it would become more "institutionalized", and the leadership would pay more attention to disaster mitigation.

In the literature of social science, state building and regime type are often considered as two fundamental elements of modern political institution (Acemoglu and Robinson 2005; North 1990; Tilly 1990, 2007). State building is a broader concept related to the monopoly of coercion, legitimacy, the rule of law, developmental strategy, and the administrative structure, etc (Fukuyama 2004; Geddes 1994; Johnson 1982). Although some scholars criticized the lack of conceptual clarity, state building has been applied to classify the fragile governments in the theories and practices of international relations field (Fritz and Menocal 2007). In the post-conflict and post-disaster management arenas, international organizations usually had to deal with state fragility, which frustrates the international engagement and humanitarian aids (OECD 2008; Jha et al. 2010).

Despite the multi-dimensional capacity implied in the concept "state building", disaster researchers shall emphasize more on the disaster-related state capacity (Burkle 2006). In the large-scale disasters, the rescuers and survivors have to secure lives by rapidly concentrating and distributing necessities according to complete and correct information (Drabek 1986). Conversely, a disaster's impacts usually

undermine state capacity in resource mobilization and distribution as well as information collection and transmission. To save lives and properties of citizens, the state has to rapidly restore infrastructures such as telecommunications, emergency medical and public health systems, clear water and food supply systems, power, and public security, etc. All these tasks primarily need the extractive capacity of fiscal resources and information via a rational and transparent bureaucracy, and weak state capacities in resource mobilization and intelligence would threaten the lives of survivors and increase mortality.

Some earlier studies explained the disparity of disaster-related state capacity by elites' incentives to protect citizens from disasters (Keefer, Neumayer and Plümper 2010), however, the disaster-related state capacity contains institutions irrelevant to the incentives for political elites. Some disaster-related state institutions such as the fiscal system, military force, intelligence, and public health system are usually shaped by political struggles and institutional legacies irrelevant to preceding disaster experiences. Others such as emergency budget bills for a disaster reconstruction, which are the incentive-linked policies, still robustly depend on the incentive-unrelated fiscal institutions.

In addition, political elites are not the only actor in disaster management. Civil associations and social networks can be the substitute of the state in mobilizing and

distributing resources after the disasters (Ö zerdem and Jacoby 2006); mass media and the Internet can be the substitute of the state in collecting and diffusing information for rescuers and survivors. Nevertheless, the mobilization capacity of civil society and the freedom of speech are to a large extent constrained by the regime type, democracy or not.

Aside from incentives for political elites, a substantial difference between democracy and autocracy is people's degree of freedom. In democratic countries, people's civil liberties and political rights are committed (Dahl 1972). As social movement studies discovered (McCarthy and Zald 1977), a more open political opportunity structure strengthens civil association's capacity of resource mobilization, which is helpful to deliver goods and services after disasters. Similarly, higher degree of media freedom improves information completeness, which is helpful to diffuse information related to disaster relief and mitigation and to prevent political corruption. In contrast, for suppressing potential oppositions, autocracies usually restrict freedoms of speech and association. In the authoritarian contexts, the lower capacity of civil society's resource mobilization and the narrower space of speech tend to amplify disaster's impacts.

The effects of political rights and civil liberties are complicated, however. Without civil liberties, the government's control on media, the Internet and civil

association reduces the likelihood to expose the real death toll. After the disaster, because of the weak mass media and civil society, the same government control increases the number and losses of affected population. In contrast, without political rights, especially without enfranchising, the autocracy would have less incentive to secure lives, leading to rise in the death toll. After disasters, the ruling elites may refuse to recognize the survivors' political entitlements (Sen 1981), in order to reduce the official figures on the losses of affected population. I suggest labeling the first bias as the "illiberal bias", which leads to underestimating death toll but increase in the figure of affected survivors and their losses; while labeling the second bias as the "authoritarian bias", which leads to underestimating the number of affected survivors and their losses, but increase in the death toll.

Even though the two biases distort our statistical results, we can still find some methods to investigate the major effects of democracy to reduce the measurement error. In the following sections, I will use the cases of the four earthquakes happened in Japan (1995), India (2001), China (2008), and Haiti (2010) as well as two additional cases, the Indian Ocean tsunami (2004) and the Japanese Tōhoku tsunami (2011) to demonstrate the effects of state capacity and regime type in governing catastrophic disasters. The comparative study is partially based on the fieldwork (China and Japan) and partially depends on the second-hand literatures (India and

Haiti). In addition, I will use a panel dataset to estimate the impacts of state capacity and regime type on the proportion of death and affected population, and try to single out the political biases from the statistical models. Both methods show the importance of state capacity and democracy and their interaction in shaping the human vulnerability.

2. State Capacity and Regime Type: a Comparative Study

The following comparative study of disasters and aftermath shed lights on how the state capacity and regime type work on human vulnerability. Four earthquakes—the 1995 Hanshin (also called Kobe) Earthquake in Japan, the 2001 Gujarat (also called Bhuj) Earthquake in India, the 2008 Sichuan (also called Wenchuan) Earthquake in China, and the 2010 Haiti Earthquake—are discussed to analyze the influence of state capacity and different regime types when facing disasters. The comparative framework can be simply illustrated by a two-by-two table: (1) strong state with a democratic regime: the Hanshin Earthquake; (2) weak state with a democratic regime: the Gujarat Earthquake; (3) strong state with a non-democratic regime: the Sichuan Earthquake; and (4) weak state with a non-democratic regime: the Haiti Earthquake (Table 1). The framework effectively

shows the relationship between political institution and disaster damage.

[Table 1 about HERE]

Japan: Strong Democracy

The Hanshin Earthquake, measured Richter magnitude scale 7.3, occurred on Tuesday, January 17, 1995. According to the official record after one decade, 6,434 people lost their lives and 14,678 injured. The earthquake also destroyed 67,421 and damaged the other 55,145 buildings. Occurred at the second largest metropolis, the disaster caused serious economic loss that is close to 2.5 percent of Japan's GDP at that year. Statistics show that approximately 60 percent of the victims belonged to the aged population, mostly living in the traditional wood-frame houses, and suffered from the post-disaster fires (The City of Kobe 2009). In the 2011 Tōhoku Earthquake the percentage of aged victims is even higher than the percentage thereof in the Hanshin Earthquake after 16 years. The building environment and aging caused the specific social vulnerability of Japanese society (Maeda 2007).

From the 1980s on, Japan has usually been taken as a typical case of the East Asian "developmental state," which refers to the phenomenon that it has a strong state capacity that intervened in the industrial development (Johnson 1982; Amsden 1989; Wade 1990). Although the slow government actions in dealing with the aftermath of Hanshi Earthquake irritated the Japanese public (Nakamura 2000), the

number of victims was still much lower than the similar cases occurred in the other developing countries. Evacuation shelters were closed in August 1995, waiting houses were operated until March 1997, and most destroyed residences were rebuilt before March 1998 (City of Kobe 2009). Comparing to the near earthquakes happened in Turkey (1999) and India (2001), the speed of government emergency response and the quantity of reconstruction resources still displayed the relative advantages of Japan's strong state.

It should be noticed that, before the disaster, Japan's strong state is accused to be the obstacle of civil society's development (Özerdem and Jacoby 2006). In contrast to disaster relief efforts in some non-democratic countries, nevertheless, the Japan's consolidated democracy offered a more open political opportunity structure for the mobilization of civil associations. Most scholars and observers agree that the actions of Japanese civil associations and volunteerism (namely "social capital," Aldrich 2010), as well as the criticism presented on the mass media, robustly improved the private and public practices on reconstruction and mitigation after the earthquake. Summing up, the Hanshin case showed the possibility of relief actions coordinated by a strong state and an active civil society.

India: Weak Democracy

The Gujarat Earthquake occurred on January 26, 2001. It measured Richter

magnitude scale 7.6-8.1, caused 19,727 deaths and nearly 167,000 injured. The earthquake also destroyed 330,000 and damaged the other 720,000 buildings. Some experts' report of the post-disaster responses uncovered that inequality in the traditional caste system, local patronage politics, and religious cleavages affected the distribution of hazard and the delivery of relief resources (Mistry et al 2001). The political corruption, caste system and religious divisions caused the specific allocation of social vulnerability in India.

Comparing to the East Asian developmental states, as Vivek Chibber (2003: 21) claimed, the Indian state building is much more fragmented, which frustrated the development of a more rational bureaucracy. Although the Gujarat is ranked as the third prosperous and industrialized state, after the Maharashtra and the Punjab, until the earthquake the state has long lacked a comprehensive disaster management project. The weak state building undermined the capacity of information collection and resource distribution after the disaster (Kaur 2006). Without plan and information, the government's initial reaction was "slow, ad-hoc and chaotic" (Ö zerdem and Jacoby 2006: 72), and the reconstruction mainly depended on an owner-driven approach partly funded and mediated by the NGOs.

Benefited from the political freedom, the Indian civil society was more energetic than the state after the disaster. The coordination of the rehabilitation

process was carried out by the local government, which formed the Gujarat State Disaster Management Authority (GSDMA), and the third sector, some under the umbrella of *The Sustainable Environment and Ecological Development Society*. Even though the coordination process was criticized as somewhat top-down decision-making, the performance of civil associations in the Gujarat was usually praised as an alternative reconstruction model under a weak state (Ö zerdem and Jacoby 2006).

China: Strong Authoritarianism

The Wenchuan Earthquake occurred in China's Sichuan Province, one of the poorest agricultural provinces of China on May 12, 2008. It measured Richter magnitude scale 7.9-8.0. According to the official report, 87,148 people died (included missing) and more than 374,643 were injured (Deng 2009). The earthquake destroyed and damaged approximately 4 million buildings, the economic loss was up to 2.8 percent of China's GDP of that year. According to my fieldwork, most victims lost their lives in villages, towns and some small cities, namely the rural and suburban areas. It reflected China's rural-urban inequality based on the "Hukou (household registration)" system (Wu and Treiman 2007), which has become a specific source of social vulnerability in the earthquake (Lin 2010).

In contrast to India, China is governed by a relatively strong party-state under

authoritarianism. Although some political scientists viewed the Chinese Communist regime as a case of the "fragmented authoritarianism," implied that the bureaucratic rationality was frustrated by the horizontally and vertically differentiated agencies (Lieberthal and Oksenberg 1988), most scholars agreed that, under the rapid economic growth, the Chinese state capacity is significantly strengthening (OECD 2003; Wong and Woo 1995; Yang 2004). Paralleling to the efficient Japanese government after the Hanshin earthquake, in less than four years the Chinese state has efficiently rebuild several dozens of new cities and towns, including public buildings and private residences for relocating the affected population (Lin 2010).

As some observers argued, Chinese civil associations rose and strengthened in the initial relief period (Teets 2009). Due to some political concerns, however, the authoritarian regime gradually suppressed the active civil society soon after (Deng 2009; Gadsden 2008). Excluding the participation of peasants and citizens, the reconstruction projects, dominated by local cadres, largely focused on tourist industry and real estate development. Corruption, unequal distribution and quality flaws of the new buildings sparked hundreds of protests in Sichuan. The protesters usually accused that the local cadres and land developers of illegally expropriating peasants' farmlands in the name of reconstruction and development (Lin 2010). The Sichuan case showed that a strong state-led reconstruction might be effective, but

the non-democratic policy-making process resulted in unequal distribution, corruption, and widespread social discontents.

Haiti: Weak Non-democracy

The Haiti Earthquake occurred in a small town near-Port-au-Prince on January 12, 2010. It measured Richter magnitude scale 7.0-7.1. According to the Haitian official estimation, it killed approximately 230,000 and injured some 300,000 people. The earthquake also destroyed 250,000 private residences and 30,000 commercial and public buildings, including the Presidential Palace and the headquarters of the United Nations Stabilization Mission in Haiti (MINUSTAH). As the Human Development Index ranked, Haiti is the poorest country in the Americas, and has long suffered from the political instability and violence even before the earthquake. In contrast to the Japanese case with a large aged population, poverty results in Haiti's high fertility, and led to the high social vulnerability of children in the disaster—17 percent of victims were less than 5 years old (Bayard 2010).

Comparing to the preceding cases, Haiti's state building is much weaker than the others. Due to the colonial legacy, geographic politics, and unstable dictatorship, scholars have usually taken the Haiti government as an example of the fragile state far before the disaster (Girard 2005; 2010). In 2004, a rebellion, soon became a *coup d'état*, leading to expel of President Jean-Bertrand Aristide, whereupon the United

Nations stationed peacekeepers in Haiti. Two years after Aristide's expel, an election was held, however, was suspected to be fraud and led to political turmoil. Under the state fragility and political instability, the administrative capacity collapsed after the shock of the earthquake.

Even though the Diaspora community was supportive, under the constraints of political instability, the Haiti civil society was relatively divided and weak before the disaster (Pierre 2006). The emergency and relief actions mainly depended on the international humanitarian aids from UN troops, US military, organizations such as the World Health Organization, etc. Until the end of 2010, more than one million people still lived in the shelters, suffered from the following flood and disease (Lau 2010). The Haiti case showed that the impact of state failure might be more terrible than the impact of the disaster itself.

[Table 2 about HERE]

The basic descriptive statistics of the four earthquakes see Table 2, which also lists Freedom House's civil liberty score (1=free; 7=not free) and government expenditure divided by the Gross Domestic Product (GDP) of the four countries as the references of regime type and state capacity. In Japan's case, the resource mobilization of the government as well as the third sector was more efficient, the distribution of resource was less controversial, and the number of victims and

affected population were smallest among the four examples. In the India case, the government reaction was slow but the resource mobilization of civil associations was efficient; relatively, the distribution of resources was less controversial. In the Chinese case, the party-state effectively mobilized the resources and suppressed the civil participation, but the unequal distribution and corruption triggered numbers of social protests. Finally, the Haitian state has collapsed and the civil society was too weak to be the substitute of the government. Although in terms of scale and population density, the Haiti Earthquake is similar to the Hanshin Earthquake, the former led to the highest mortality of disasters in the recent years.

In contrast to the earthquakes, which are not able to be forecasted and evacuate residents in advance, the damage of tsunami displays more difference between the strong state and the weak state. Although the 2004 Indian Ocean earthquake-tsunami and the 2011 Japanese Tōhoku earthquake-tsunami are on the similar scale, around 220,000-280,000 lives were lost in the former, which is 10-15 times more than the later. According to the studies on the Indian Ocean tsunami, nearly all of the victims were taken completely by surprise. The hardest hit countries—Indonesia, Sri Lanka, India and Thailand—did not have any warning system and evacuation plan (Rodriguez et al. 2006). Despite the chaotic performance dealing with the meltdown of nuclear power plants, still, the Japanese government has minimized the tsunami

mortality with advanced warning technology and active local associations.

Can we also find the "authoritarian bias" in the comparative study? The last two rows on Table 2 display the proportion of official homeless number divided by death number and the economic loss estimation. The proportion of homeless/death shows that in non-democracies such as China and Haiti, the number of homeless tend to be underestimated. The number of economic loss shows that in the less advanced economies, such as India and Haiti in the four cases, economic cost of disaster tend to be underestimated. To some extent, the comparison displays the measurement biases derived from regime type and economic development. In the next section, to deal with the measurement issues, a panel data is used to test the relationship among state capacity, democracy and human vulnerability.

3. Data and Measurement

The short review of the four selected earthquakes and two tsunamis examines the causality among state capacity, democracy and disaster. To test the hypotheses implied in the framework, I analyze the determinants of disaster mortality and the weight of affected population. Following the earlier studies (Kahn 2005; Noy 2009), I use disaster data from the Emergency Event Database (EM-DAT 2010) collected

by the Centre of Research on the Epidemiology of Disasters (CRED). For a disaster to be included into the EM-DAT, it must fulfill at least one of the following criteria: (1) 10 or more people reported killed; (2) 100 people or more reported affected; (3) declaration of a state of emergency; or (4) call for international assistance. Specifically, the database offers the annual numbers of killed and affected population, who suffered from physical injuries, trauma or an illness requiring medical treatment as a direct result of a disaster, needing immediate assistance for shelter, and requiring immediate assistance during a period of emergency; the displaced or evacuated people also count.

The EM-DAT collected 14 kinds of "natural" and "human-made" disasters. I take the impacts of 14 kinds of disasters as the major components of dependent variables. In addition, to separate the two different sources of disasters, the paper use the 11 kinds of natural disasters—flood, drought, storm, mass movement dry and wet, extreme temperature, earthquake, volcano, wildfire, insect infestation, epidemic and complex disasters involved at least two kinds of natural disasters—to calculate the impacts of "natural" disasters. In effect, as we will see, dropping the other three kinds of "human-made" disasters—transport, industrial and miscellaneous accidents—does not change the statistical results a lot. The similar results imply that the division of "natural" and "human-made" disaster is easily overstated.

For the purpose of international comparison, I built three standardized measurements of human losses. The first measurement, labeled as the "Disaster Death Ratio (DDR)", is the logarithm of the annual sums of disaster death per 100,000, divided by the national population in the same year; that is, the logarithmic annual mortality rate caused by disasters. The second measurement, labeled as the "Disaster Affected Ratio (DAR)", is the logarithm of the annual sum of disaster-affected survivors per 100,000, also divided by the national population. The reason taken the natural logarithm transfer is that a lot of country-year sum close to zero and results in the skewed-to-the-left of the dataset, which is better normalized before statistical estimation. The third proxy of human vulnerability is the "Disaster Affected Index (DAI)", calculated from the following formula:

$$\mathrm{DAI} = \log\left(\frac{\mathrm{Death} + \mathrm{Affected}}{\mathrm{National\ Population}} \times 100{,}000\right)$$

$$= DDR + DAR$$

The DDR and DAI are two major dependent variables measuring human vulnerability in the following statistical models. In contrast to the earlier studies, which simply used the annual sum of fatality as the dependent variable and put the national population into the right-hand of the equation (Kahn 2005; Escaleras,

Anbarci and Register 2007; Keefer, Neumayer and Plümper 2010), the DDR, DAR and DAI are better off because they could avoid the measurement error derived from the strong association between the disaster death/affected number and the size of national population by directly calculating national mortality under disaster impact. For comparing all disaster impacts and "natural" disaster impacts, I also estimate the total DAI (TDAI) and "natural" DAI (NDAI) in the following models.

Despite death and affected number, the EM-DAT also offers the estimated economic loss of each disaster. In contrast to the human losses, it has been noticed that the economic parameter may underestimate the losses in the developing countries (Gall, Emrich and Cutter 2008). It still needs more efforts to adjust the error, standardize the indicator, and justify by theory (Neumayer and Barthel 2011). For avoiding the obvious measurement error in economic losses, here the simply measurement of human vulnerability is preferred.

State capacity, the major political institution associated with disaster management, can be separated into the capacities of resource mobilization and information circulation. I divided the government expenditure by GDP, the relative fiscal scale of the state, to measure the capacity of resource mobilization (Levi 1988). Even though some scholars complained that the one dimensional measurement might hardly reflect legitimacy, bureaucratic rationality, taxation structure, and the

other complex aspects of state building (Lieberman 2002), the government scale is still the most popular index measuring the resource extracting capacity of states (Bräutigam, Fjeldstad and Moore 2008; Brown and Hunter 1999; Cheibub 1998). The scale is calculated mostly based on the World Bank's World Development Indicators (WDI), covering 230 countries between 1960 and 2010. It shall be noticed that the marginal effect of state extractive capacity may gradually reduce, so I put the square of the variable into the models.

The Corruption Perception Index (CPI), conducted by the Transparency International (TI), is introduced to measure the state capacity of information collection. The CPI, weighted by expert opinion and relevant surveys, covered the corruption perception of 195 countries from 1995 to 2010. It is scored from 0 to 10; higher score refers to the higher degree of political transparency. Theoretically, political corruption derived from the principal-agent problem between the government and the governed as well as information asymmetry between the government and the citizens (Rose-Ackerman 1978). It is nurtured not only by the lack of accountability and the lack of rule of law, but also by the weak state capacity of information collection (Escaleras et al. 2007; Green 2005). Therefore, the CPI uncovered the negative effects of corruption in itself and the weak state information capacity on disaster management.

The Freedom House Foundation's freedom status, a measurement of democracy widely used by political scientists (Diamond 2002; Tilly 2007), is applied to categorize regimes. Covering the freedom status of 172 countries from 1972 to the present, the Freedom House database is more sensitive to freedom of speech and association than the other surveys such as the Polity and the Electoral Democratic Index (EDI) focusing more on the electoral fairness (Munck and Verkuilen 2002). In the original Freedom House typology, regimes are divided into three categories: non-democracy, partial democracy and full democracy. Following the suggestion of Adam Przeworski et al. (2000), I combined the partial democratic and non-democratic countries and simply use two categories: democracy and non-democracy.

Rather than measuring elites' incentives under political institutionalization by the age of democracy and autocracy (Keefer, Neumayer and Plümper 2010), I separately measured the incentive-related state capacities by an interaction term of democratic dummy and government scale. The negative correlation of the interaction term and the DDR/DAI implies that, in contrast to non-democracy, a democratic regime's expenditure effectively reduces disaster mortality. It also suggests that, as some earlier studies found, the democratic leadership has stronger incentives to protect citizens from the impact of disasters.

The effects of civil liberties and political rights on the official disaster-reporting process and disaster related entitlements are multifaceted, yet. When I measured the "illiberal bias" by the civil liberty score (1-7, 1 = free, 7 = not free) from the Freedom House database, and expected that countries with higher score should have lower DDR in the reporting process. After disaster, however, the countries with higher score shall have more suffering population, reflected on the DAI. On the other hand, I measured the "authoritarian bias" by the political rights score (1-7) from the Freedom House database, and assumed that countries with higher score shall raise higher DDR but reduced DAI during reconstruction.

As the last section shows, each country has its own sources of social vulnerability. In this section I used some basic socio-economic indexes to manage the cross-national differences of social vulnerability. The first index is the Gini coefficient, which is wildly applied to measure income inequality in cross-national studies (Anbarci et al. 2005). In the panel data, the Gini coefficient is introduced by the Standardized World Income Inequality Database (SWIID 2009), and covered income inequality indicators of 158 countries from 1960 to 2008. According to the theory of social vulnerability, wherever the income variation comes from in each country (i.e., either from caste in India or from Hukou system in China), the higher degree of income inequality would lead to greater inequality of hazard distribution

(Cutter 1996); in addition, higher inequality may reduce the probability of citizens taking collective actions in preventing the poor from the impacts of disasters (Anbarci et al. 2005).

Another important source of human vulnerability is the economic development standard (Kahn 2005), measured by the natural logarithm of GDP per capita from the WDI database. The relationship between economic development and vulnerability might be non-linear, nevertheless. I input the square of log GDPpc into the model and found the reducing marginal effect of economic development on the disaster mitigation. Besides, the WDI database offered a series of dependency ratios, calculated by dividing the dependent population (age>65 and age<15) by the workforce population (15<age<65), which display the demographic structure associated with human vulnerability (Donner and Rodríguez 2008). For a few countries missing from the WDI, I calculated the ratio from the Penn World Table.

The disaster dataset organized for the study comes from several different international surveys, constructed by different structure and scope in time and spaces (See Table 3). All these surveys and their pooled panel suffer from missing data (Rubin 1976). To deal with the problem, a simple rule of thumb is as following: firstly, based on the CPI (195 countries), the WDI (230 countries), and especially the SWIID (158 countries) datasets, I dropped some countries with too many missing

annual variables. It should be noticed that some weakest states without official statistics, i.e. Afghanistan, Myanmar and North Korea, are dropped from the list. A bootstrapping imputation is introduced to deal with a few missing points.[1] The selection of period from 1995 to 2009 is also a compromise of the CPI's starting year of 1995. The selected fifteen-year period keeps the greatest number of countries because it largely diminishes missing data of some changing national territories, i.e. Germany, Russia, Czech Republic, and other post-communist countries before 1990. According to the number of year-countries, this disaster dataset has the largest N when compared to the other earlier similar studies. For the remaining 155 countries, see Table 4. The descriptive statistics of major variables in the dataset please refer to Table 5, which also separately display the data of only natural disasters.

[Table 3 about HERE]

[Table 4 about HERE]

[Table 5 about HERE]

So far the country-level geographical and climate characteristics were largely neglected. Although the EM-DAT identified 14 kinds of disasters and located the

[1] I used the software Amelia II developed by Gary King to impute the missing data (King et al. 2001). Despite the major dependent variable (TDAI) and the political institution variables (government expenditure and regime type), all the other variables are taken as mutually associated in the process of imputation. The final data input into the missing one is a ten-time average number. The percentage of the original N and the final N after the imputation, please see the last column of Table 3.

countries, only a few variables are connected to the global distribution of natural hazard and geographical vulnerability. I used two methods to measure the geographical frequency and continuity of disasters. First, I calculated a “disaster density”—the annual frequency of disasters divided by the surface area of national territory of each country—which refers to the geographical density of each country’s hazard suffering from all 14 kinds of disasters. Second, I used last year’s TDDR and TDAI, namely the TDDR (t-1) and the TDAI (t-1), to estimate the continuous geographical and climate impacts. If a country usually suffers from its geographical and climate conditions, its TDDR (t-1) and TDAI (t-1) are supposed to be highly associated with its present index, which is the reason why the autoregression models are adopted.

4. Method and Result

According to the correlation matrix between the Disaster Death Ratio (TDDR), the Disaster Affected Ratio (TDAR) and the total Disaster Affected Index (TDAI) as well as the other variables on Table 6, the TDDR and TDAI are significantly correlated to the selected explanatory variables—government scale, democracy, CPI and Gini. The simple associations reveal some important relationship between

political institution, social inequality and human vulnerability.

[Table 6 about HERE]

Some figures of cross-national data in 2008 demonstrate the correlations between the TDAI and the other variables. Figure 1 demonstrates the predicted line of the relationship, an obviously negative correlation (-0.27), between government scale and the TDAI, while Figure 2 displays the relationship between the CPI and the TDAI. The predicted line examines the negative relationship, matches the -0.31 correlation between the two variables. The figures suggest that stronger state capacity of resource mobilization through taxation and of information collection with more transparency could protect people from the impact of disasters.

Figure 3 and Figure 4 illustrate the effects of Gini coefficient and log GDPpc, the major control variables measuring socio-economic vulnerability of each country. As the positive correlation 0.16 and 0.30 between the Gini-TDDR and Gini-TDAI shows that higher degree of income inequality would result in the higher likelihood to kill or affect the poor in disasters. On the other hand, as the negative correlation -0.33 between the log GDPpc and the TDAI displays, people in less developed countries suffered more form the impact of disasters.

[Figure 1-5 about HERE]

[Table 7-8 about HERE]

The simple relationship between democracy and disaster also matches the prediction. The correlation between the democratic dummy and the TDAI is -0.20, which means that the democratic regime could effectively reduce the number of affected population. In contrast, the correlation between the "illiberal bias," "authoritarian bias" and the TDAI is 0.21 and 0.15, which means that the higher degree of illiberalness and authoritarianism, the more people would suffer from disasters (See Figure 5). Before controlling other variables, the relationship between the TDAI and the two measurements of democracy is still consistent.

As the social science literatures have discovered, the macro-level explanatory variables have multifaceted relationships (Haggard and Kaufman 1995). For better control on multi-collinear associations and path-dependence of geographical factors, the disaster density and autoregression are introduced to estimate the coefficients. The frequency and continuity of physical hazard measured by the disaster density and TDDR(t-1)/TDAI(t-1) are the basic control variables in each model.

The first three models take the TDDR as the dependent variable, and the second set of three models take TDAI as the dependent variable, in contrast, the last three models take NDAI as the dependent variable. In these models, the government scale, the square of government scale, the degree of transparency (the CPI), the democratic dummy, and the linear "illiberal bias" as well as "authoritarian bias" are

the key independent variables of political institution. The Gini coefficient, log GDPpc and its square, as well as the dependency ratio are used to control the other aspects of socio-economic vulnerability. For controlling the correspondent global geographical and climate events, all the yearly dummy variables are counted.

It should be noticed that economic development and demographic structure could potentially suffer from endogenous problem. As some economists argued, it is reasonable to believe that in the same year the impact of disasters could reduce the annul GDPpc (Noy 2009). Some large scale disasters causing specific impacts on younger or aging population shall change the country's dependency ratio. Therefore, I used the log GDPpc and dependency ratio of the last year to replace the data of the same year. It results in a loss of N (=2,170) in all nine models.

In the modeling process, it was found that the interaction term between government scale and democratic dummy has significantly negative effect on the TDAI and NDAI. The result implies that the impact of state capacity is stronger in a democracy than in a non-democratic country. Considering the improvement of the statistical explanatory power, I added the interaction term in the all nine models.

The statistical results of the determinants on TDDR are showed on the Table 7. Model 1 estimates the effects of political factors—government scale and its square, transparency, democracy and the interaction term. The directions and significance of

the coefficients fit our hypotheses. In model 2 I took the “illiberal bias” and “authoritarian bias” into account. The results show that illiberalness reduces the exposure of death number, while authoritarianism amplifies the number. Model 3 estimates the effects of economic development and demography. It has been discovered that the development could reduce the number of victims, but according to the positive and significant coefficient of the logarithmic GDPpc’s square, the development’s marginal effect to prevent mortality declined. In contrast, higher dependency ratio increases the death toll in disasters. After controlling the economic and demographic factors, it shall be noticed that the TDDR is not very sensitive to the difference in regime type.

Table 8 displays the determinants’ coefficients regressing on the TDAI, the measurement of disasters’ total impact on human beings. In model 4, all the coefficients are significant and the R-square is 0.235, indicating that the political institution variables—government scale, transparency, and the interaction term “democracy*government scale”—robustly decrease the number of disaster affected population. In model 5, it is found that the “illiberal bias” increases the disaster scale and the “authoritarian bias” reduces the affected population. After controlling the effects of economic development and demographic structure, still, model 6 illustrates that transparency, government scale and the interaction term significantly

reduce the TDAI, which implies that the disaster-related state capacities—especially in democratic countries—effectively diminish disaster impacts on human beings. Also, the variables represented socio-economic vulnerability, such as the Gini and economic development, match the direction of theoretical expectations.

For comparing the similarity and differences between the TDAI and NDAI, the same models regressed on the latter are estimated and demonstrated on Table 9. Since most disasters resulted in serious impacts and death are large-scale natural disasters—especially storm, floor, earthquake and dry, the coefficients on Table 9 are very similar to those on Table 8. The NDAI models' outcomes tell us that the "natural" disasters are not that natural, but still social and political. In addition, the difference of sources between "natural" and "human-made" disasters should not be overestimated.

There are some limitations in explaining the statistical results, for example, the geographical and climate factors cannot be easily singled out from the disaster dataset; meanwhile, some methodological issues still need to be tackled by improving the quality of cross-national panel data and introducing particular models. At least, the outcome from the global database is consistent to the analytical framework of human vulnerability derived from the comparative study[2].

[2] I also applied the Random-Effect (RE) and Fixed-Effect (FE) model, similar to controlling all the country-dummies in the OLS model, to estimate the relationship between the yearly variation of

5. Conclusion and Discussion

How governments deal with natural disasters could be a matter of life and death for their citizens. In the disaster research field, a theoretical framework to investigate the relationship between political institution and disasters is wanted. In this article, I argue that, in the modern political institution, two fundamental elements—state capacity and regime type shape the strategy of governing disaster and determine scale of human impact. State building, especially in disaster-related state capacity, such as resource mobilization and information circulation, could change the likelihood of people's survival in large-scale disasters. Strong states, especially democracies, save more lives than the other types of regimes.

Political incentives for political elites do matter, but they are not the only actor in the disaster relief. The capacity to mobilize resources and circulate information can be performed by civil associations and mass media. However, the activeness of civil associations and mass media is constrained by the regime type. Democratic governments usually open political opportunity structure for the civil associations

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TDDR/TDAI and the selected variables. Under the rigid constraints of the FE model, only government scale, transparency, Gini and economic development are significant. The R-square overall of FE model is too small to estimate the dataset. It suggests that the variation of TDDR/TDAI is mainly resulted from the international differences rather than the frustration over time.

and mass media; in contrast, authoritarian governments usually restrict the freedom of association and the freedom of speech even under the threat of disasters. Illiberalness and authoritarianism undermine the accountability and transparency of policy-making process in disaster management, and tend to block disaster-related news, constrain entitlements to victims, underestimate the losses, and bias the data of cross-national surveys.

How governments dealt with the mitigation and aftermath of the four earthquakes that occurred in Japan, India, China and Haiti illustrates the differences of state capacity and regime type on disaster management. The Japanese case showed the comparative advantage of strong state and democracy in reducing the damage. The India case showed people's resilience supported by the active third sector without a strong state under democracy. The Chinese case presented that, without democratic participation, the effective reconstruction led by a strong party-state could result in widespread social discontents. At last, the Haiti case displayed the worst post-disaster scenario: people suffered from the economic stagnation, political instability and diseases under a weak state. The two additional cases, 2004 Indian Ocean earthquake-tsunami and the 2011 Japanese Tōhoku earthquake-tsunami support the same theoretical framework.

The comparative study examined the relationship between state capacity,

democracy and disaster. To generalize the theory, I estimated the Autoregression model by a pooled panel dataset of 155 countries from 1995 to 2009. The result of statistical models suggest that the stronger state capacity to mobilize resources, measured by government spending scale, and the capacity to collect information, measured by political transparency, did reduce the proportion of disaster affected population. The democracies performed better than the non-democracies in terms of government spending. Certainly, the "illiberal bias" and "authoritarian bias" prejudiced the information and entitlement of the victims, led to some measurement errors, but not to the extent neutralizing the main effect of regime type.

Disaster management includes not only the physical environment, but also the social and political perspectives. Weak state capacity and non-democratic regime would result in a specific "political vulnerability" for human beings. The tentative conclusion implies that the disaster relief and mitigation should take political institution into account. In some state failure cases, it is suggested that the international humanitarian aid groups should work in favor of reconstruction projects partly wrapping the rebuilding of state capacity and the promotion of democracy. When trying to reduce the damage of the "tiger," we also have to deal with the tyranny.

Table 1. Political Institution and Vulnerability of Disasters

		Regime Type	
		Democracy	Non-democracy
State Capacity	Strong	Hanshin Earthquake (Japan 1995)	Sichuan Earthquake (China 2008)
	Weak	Gujarat Earthquake (India 2001)	Haiti Earthquake (Haiti 2010)

Table 2. Selected Descriptive Statistics of the Four Earthquakes (and Two Tsunamis)

Items\Earthquake	Earthquake				Earthquake & Tsunami	
	Hanshin (1995)	Gujarat (2001)	Sichuan (2008)	Haiti (2010)	Indian Ocean (2004)	Japanese Tōhoku (2011)
Scale (Mj)	7.2-7.3	7.6-8.1	7.9-8.0	7.0-7.1	8.8-9.2	8.8-9.0
Death (+Missing)	6,434	19,727	87,148	~225,000	~276,025	20,451
Injured	14,678	167,000	374,643	>300,000	~125,000	5,699
Building damaged	122,546	>1,150,000	>4,000,000	>280,000	—	~190,000
Homeless	~230,000	~600,000	~2,000,000	~1,000,000	~1,690,000	~300,000
Affected people	~1,500,000	~19,000,000	~15,000,000	>3,000,000	~2,431,613	>5,000,000
Government expenditure/GDP	15.17%	12.36%	13.29%	—	8.32% (Indonesia) 12.63% (Sri Lanka)	20% (2009)
Civil liberty	2	3	6	5	4 (Indonesia) 3 (Sri Lanka)	2 (2010)
Homeless/death	36	30	23	4	6	15
Economic loss	$102.5 billion	$5.5 billion	$122.4 billion	$8 billion	~$10 billion	~$300 billion

Sources: Özerdem and Jacoby (2006), City of Kobe (2009), Deng (2009), Rodriguez et al. (2006), "2010 Haiti earthquake," Wikipedia: http://en.wikipedia.org/wiki/2010_Haiti_earthquake, accessed at Jan. 6, 2011, "2004 Indian Ocean earthquake and tsunami" Wikipedia: http://en.wikipedia.org/wiki/2004_Indian_Ocean_earthquake_and_tsunami, and "2011 Tōhoku earthquake and tsunami," Wikipedia: http://en.wikipedia.org/wiki/2011_T%C5%8Dhoku_earthquake_and_tsunami accessed at July. 26, 2011, also see the Emergency Event Database (EM-DAT), Freedom House, and World Development Indicators (WDI).

Table 3: Variables, Data Sources, and the Imputation of Missing Data in 1995-2009

Variable	Measurement	Data Source	N Before/After Imputation
Disaster death ratio (DDR)	$DDR = \log(\frac{\text{Death}}{\text{National Population}} \times 100{,}000)$	Emergency Event Database (EM-DAT) and World Development Indicators (WDI). The death confirmed as dead and persons missing and presumed dead.	No imputation
Disaster affected ratio (DAR)	$DAR = \log(\frac{\text{Affected People}}{\text{National Population}} \times 100{,}000)$	EM-DAT and WDI. The affected people include been injured, affected and homeless after a disaster, people suffering from physical injuries, trauma or an illness requiring medical treatment as a direct result of a disaster; people needing immediate assistance for shelter; people requiring immediate assistance during a period of emergency; it can also include displaced or evacuated people.	No imputation
Disaster affected index (DAI)	$DAI = \log(\frac{\text{Death} + \text{Affected}}{\text{National Population}} \times 100{,}000) = DDR + DAR$	EM-DAT and WDI.	No imputation
Disaster density	The number of disasters over land area (1,000,000 km²)	EM-DAT and WDI	No imputation
Government scale	Government expenditure (% of GDP)	World Development Indicators (WDI)*	2195／2325
Transparency (CPI)	Corruption Perception Index score is lower when a country is more corrupted.	Transparency International	1608／2325
Democratic regime	1= democracy; 0=otherwise	Freedom House	2303／2325
"Authoritarian bias"	Political Rights (range 1-7; 1=freedom; 7=not freedom)	Freedom House	2303／2325
"Illiberal bias"	Civil Liberties (range 1-7; 1=freedom; 7=not freedom)	Freedom House	2303／2325
Gini coefficient	Gini coefficient by net income	Standardized World Income Inequality Database_ (SWIID)	1644／2325
Economic Development	The logarithm of GDP per capita (constant 2000 US$)	World Development Indicators (WDI)*	2305／2325
Dependency ratio	Age dependency ratio (% of working-age population)	World Development Indicators (WDI)*	2310／2325

Note: *WDI excluded Taiwan. Taiwan's panels accessed from the official national statistics.

Table 4: The list of 155 Countries in the Panel Dataset

	Country		Country		Country		Country
1	Albania	40	Djibouti	79	Kyrgyz Republic	118	Romania
2	Algeria	41	Dominica	80	Lao PDR	119	Russian Federation
3	Angola	42	Dominican Republic	81	Latvia	120	Rwanda
4	Argentina	43	Ecuador	82	Lebanon	121	Senegal
5	Armenia	44	Egypt, Arab Rep.	83	Lesotho	122	Serbia
6	Australia	45	El Salvador	84	Liberia	123	Sierra Leone
7	Austria	46	Estonia	85	Lithuania	124	Singapore
8	Azerbaijan	47	Ethiopia	86	Luxembourg	125	Slovak Republic
9	Bangladesh	48	Fiji	87	Macedonia, FYR	126	Slovenia
10	Barbados	49	Finland	88	Madagascar	127	South Africa
11	Belarus	50	France	89	Malawi	128	Spain
12	Belgium	51	Gabon	90	Malaysia	129	Sri Lanka
13	Belize	52	Gambia, The	91	Maldives	130	St. Lucia
14	Benin	53	Georgia	92	Mali	131	St. Vincent and the Grenadines
15	Bhutan	54	Germany	93	Malta	132	Suriname
16	Bolivia	55	Ghana	94	Mauritania	133	Swaziland
17	Bosnia and Herzegovina	56	Greece	95	Mauritius	134	Sweden
18	Botswana	57	Grenada	96	Mexico	135	Switzerland
19	Brazil	58	Guatemala	97	Moldova	136	Taiwan
20	Bulgaria	59	Guinea	98	Mongolia	137	Tajikistan
21	Burkina Faso	60	Guinea-Bissau	99	Montenegro	138	Tanzania
22	Burundi	61	Guyana	100	Morocco	139	Thailand
23	Cambodia	62	Haiti	101	Mozambique	140	Togo
24	Cameroon	63	Honduras	102	Namibia	141	Trinidad and Tobago
25	Canada	64	Hong Kong , China	103	Nepal	142	Tunisia
26	Cape Verde	65	Hungary	104	Netherlands	143	Turkey
27	Chad	66	Iceland	105	New Zealand	144	Turkmenistan
28	Chile	67	India	106	Nicaragua	145	Uganda
29	China	68	Indonesia	107	Niger	146	Ukraine
30	Colombia	69	Iran, Islamic Rep.	108	Nigeria	147	United Kingdom
31	Comoros	70	Ireland	109	Norway	148	United States
32	Congo, Dem. Rep.	71	Israel	110	Pakistan	149	Uruguay
33	Congo, Rep.	72	Italy	111	Panama	150	Uzbekistan
34	Costa Rica	73	Jamaica	112	Papua New Guinea	151	Venezuela, RB
35	Cote d'Ivoire	74	Japan	113	Paraguay	152	Vietnam
36	Croatia	75	Jordan	114	Peru	153	Yemen, Rep.
37	Cyprus	76	Kazakhstan	115	Philippines	154	Zambia
38	Czech Republic	77	Kenya	116	Poland	155	Zimbabwe
39	Denmark	78	Korea, Rep.	117	Portugal		

Table 5: Descriptive Statistics of Selected Variables

Variable	Mean	S. D.	Minimum	Maximum
Disaster affected index (TDAI)*	3.018	3.362	-4.681	11.394
Disaster death ratio (TDDR)	-0.602	1.425	-6.022	5.450
Disaster affected ratio (TDAR)	2.967	3.389	-6.073	11.394
Disaster density (14 disasters)	75.463	198.061	0	6666.667
Natural disaster affected index (NDAI)*	2.934	3.407	-6.344	11.394
Natural disaster death ratio (NDDR)	-0.825	1.592	-6.565	5.500
Natural disaster affected ratio (NDAR)	2.988	3.309	-6.073	11.394
Natural disaster density (11 disasters)	48.321	265.950	0	3333.333
Government scale	15.619	5.798	1.401	50.362
Transparency (CPI)	4.052	2.151	0.4	10
Democratic regime	0.458	0.498	0	1
“Authoritarian bias”	3.249	2.048	1	7
“Illiberal bias”	3.261	1.663	1	7
Gini coefficient	39.191	8.897	18.486	68.271
Economic Development	7.589	1.593	4.131	10.944
Dependency ratio	64.374	18.002	32.768	109.539

Note: *The 11 kinds of “natural” disasters in NDAI are flood, drought, storm, mass movement dry, mass movement wet, extreme temperature, earthquake, volcano, wildfire, insect infestation, epidemic and complex disasters; the additional 3 kinds of “human-made” disasters in TDAI are transport, industrial and miscellaneous accidents.

Table 6: The Correlation Matrix of Selected Variables

Variables	TDAI	TDDR	TDAR	Gini	Gov. scale	Democracy	CPI	Authoritarian	Illiberal	Develop.
TDDR	0.13									
TDAR	0.98	0.07								
Gini	0.30	0.16	0.29							
Government scale	-0.27	-0.03	-0.27	-0.20						
Democratic regime	-0.20	-0.13	-0.20	-0.31	0.33					
Transparency (CPI)	-0.31	-0.16	-0.31	-0.45	0.40	0.61				
“Authoritarian bias”	0.15	0.13	0.15	0.27	-0.32	-0.84	-0.61			
“Illiberal bias”	0.21	0.12	0.21	0.31	-0.33	-0.83	-0.69	0.91		
Economic Development	-0.33	-0.21	-0.33	-0.44	0.35	0.64	0.83	-0.62	-0.70	
Dependency Ratio	0.25	0.21	0.24	0.51	-0.27	-0.46	-0.53	0.45	0.50	-0.73

Note: all the coefficients passed two-tails tests, $p<.05$.

Table 7: Political Institution, Social Inequality and Total Disaster Death Ratio (TDDR)

	Disaster Death Ratio (TDDR)		
	1	2	3
Autoregression (t-1)	0.2238***	0.2205***	0.2042***
	(0.0208)	(0.0208)	(0.0209)
Disaster density	0.0005***	0.0005***	0.0005***
	(0.0001)	(0.0001)	(0.0001)
Government scale	-0.0399*	-0.0421*	-0.0339+
	(0.0198)	(0.0198)	(0.0201)
Gov. scale^2	0.0012*	0.0013*	0.0010+
	(0.0005)	(0.0005)	(0.0005)
Transparency	-0.0661***	-0.0771***	0.0180
	(0.0190)	(0.0209)	(0.0319)
Democracy (=1)	-0.3338+	-0.2806	-0.2487
	(0.1852)	(0.2043)	(0.2058)
Democracy*Gov. scale	0.0175	0.0171	0.0160
	(0.0111)	(0.0111)	(0.0111)
Gini coefficient	0.0141***	0.0142***	0.0049
	(0.0037)	(0.0037)	(0.0043)
"Illiberal bias"		-0.0964+	-0.1129*
		(0.0506)	(0.0505)
"Authoritarian bias"		0.0812*	0.0719+
		(0.0388)	(0.0387)
log GDPpc (t-1)			0.5013*
			(0.2340)
log GDPpc^2 (t-1)			-0.0403**
			(0.0156)
Dependency ratio (t-1)			0.0090**
			(0.0029)
Constant	-0.5490*	-0.2517	-2.4059*
	(0.2686)	(0.3387)	(0.9591)
Year Dummy	Yes	Yes	Yes
R-square (adjusted)	0.1295	0.1306	0.1416

Note: N=2,170; "+" p<.1, "*" p<.05, "**" p<.01, "***" p<.001.

Table 8: Political Institution, Social Inequality and Total Disaster Affected Index (TDAI)

	Disaster Affected Index (TDAI)		
	4A	5A	6A
Autoregression (t-1)	0.2482***	0.2369***	0.2208***
	(0.0206)	(0.0207)	(0.0207)
Disaster density	0.0008***	0.0008***	0.0009***
	(0.0002)	(0.0002)	(0.0002)
Government scale	-0.1594***	-0.1561***	-0.1131*
	(0.0438)	(0.0436)	(0.0441)
Gov. scale^2	0.0028*	0.0026*	0.0016
	(0.0012)	(0.0012)	(0.0012)
Transparency	-0.2097***	-0.1936***	-0.1163+
	(0.0419)	(0.0458)	(0.0697)
Democracy (=1)	0.8795*	0.2858	0.6418
	(0.4075)	(0.4471)	(0.4503)
Democracy*Gov. scale	-0.0505*	-0.0494*	-0.0591*
	(0.0244)	(0.0243)	(0.0244)
Gini coefficient	0.0565***	0.0556***	0.0650***
	(0.0081)	(0.0081)	(0.0096)
“Illiberal bias”		0.3354**	0.2839*
		(0.1108)	(0.1104)
“Authoritarian bias”		-0.4145***	-0.3987***
		(0.0852)	(0.0849)
log GDPpc (t-1)			-1.9248***
			(0.5128)
log GDPpc^2 (t-1)			0.1030**
			(0.0341)
Dependency ratio (t-1)			-0.0099
			(0.0062)
Constant	2.6869***	2.5807***	10.6363***
	(0.5954)	(0.7432)	(2.1416)
Year Dummy	Yes	Yes	Yes
R-square (adjusted)	0.2354	0.2432	0.2538

Note: N=2,170; “+” p<.1, “*” p<.05, “**” p<.01, “***” p<.001.

Table 9: Political Institution, Social Inequality and Natural Disaster Affected Index (NDAI)

	Natural Disaster Affected Index (NDAI)		
	4B	5B	6B
Autoregression (t-1)	0.2474***	0.2365***	0.2204***
	(0.0206)	(0.0206)	(0.0207)
Natural disaster density	0.0015***	0.0016***	0.0016***
	(0.0002)	(0.0002)	(0.0002)
Government scale	-0.1721***	-0.1693***	-0.1281**
	(0.0444)	(0.0442)	(0.0447)
Government scale^2	0.0031*	0.0029*	0.0019
	(0.0012)	(0.0012)	(0.0012)
Transparency	-0.2188***	-0.2031***	-0.1074
	(0.0426)	(0.0466)	(0.0712)
Democracy (=1)	0.8384*	0.2314	0.5694
	(0.4121)	(0.4526)	(0.4562)
Democracy*Gov. scale	-0.0496*	-0.0477+	-0.0565*
	(0.0247)	(0.0246)	(0.0247)
Gini coefficient	0.0533***	0.0527***	0.0624***
	(0.0082)	(0.0082)	(0.0096)
"Illiberal bias"		0.3330**	0.2838*
		(0.1121)	(0.1117)
"Authoritarian bias"		-0.4137***	-0.3993***
		(0.0859)	(0.0856)
log GDPpc (t-1)			-1.8478***
			(0.5201)
log GDPpc^2 (t-1)			0.0958**
			(0.0347)
Dependency ratio (t-1)			-0.0116+
			(0.0063)
Constant	2.6055***	2.8104***	11.4883***
	(0.6047)	(0.7574)	(2.1412)
Year Dummy	Yes	Yes	Yes
R-square (adjusted)	0.2408	0.2484	0.2587

Note: N=2,170; "+" p<.1, "*" p<.05, "**" p<.01, "***" p<.001.

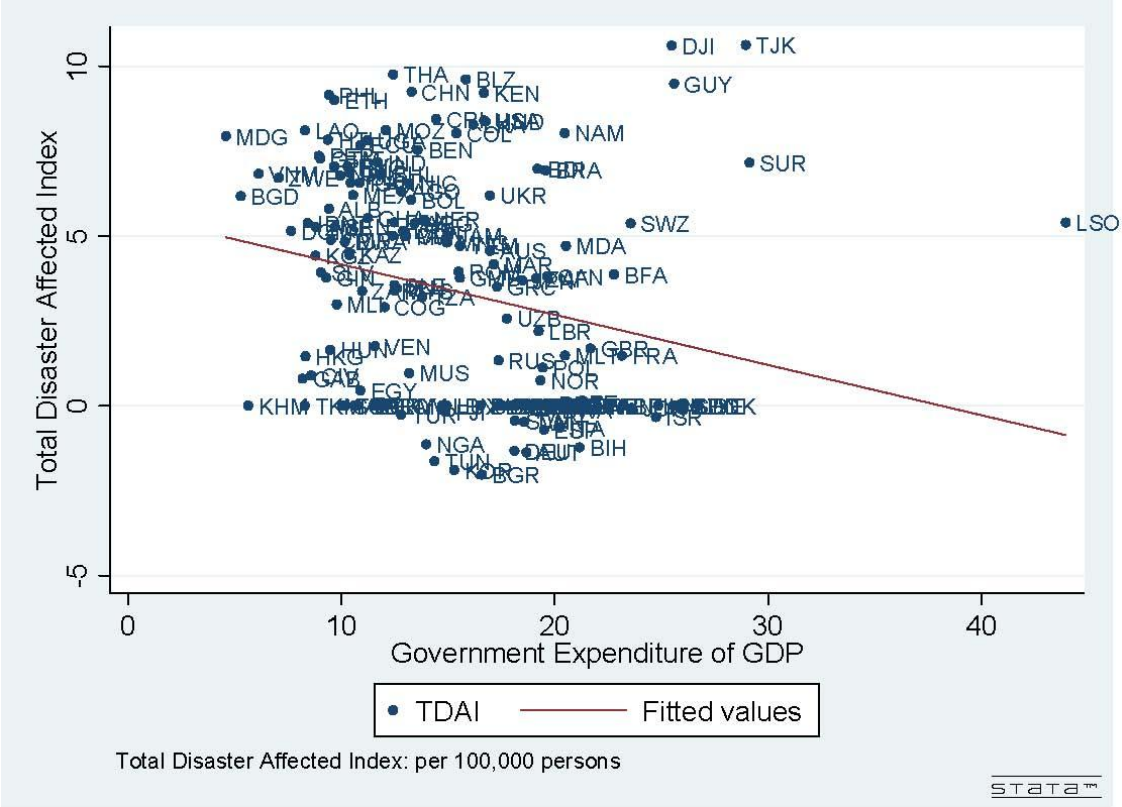

Figure 1: State Capacity and Disaster Affected Index, 155 countries in 2008

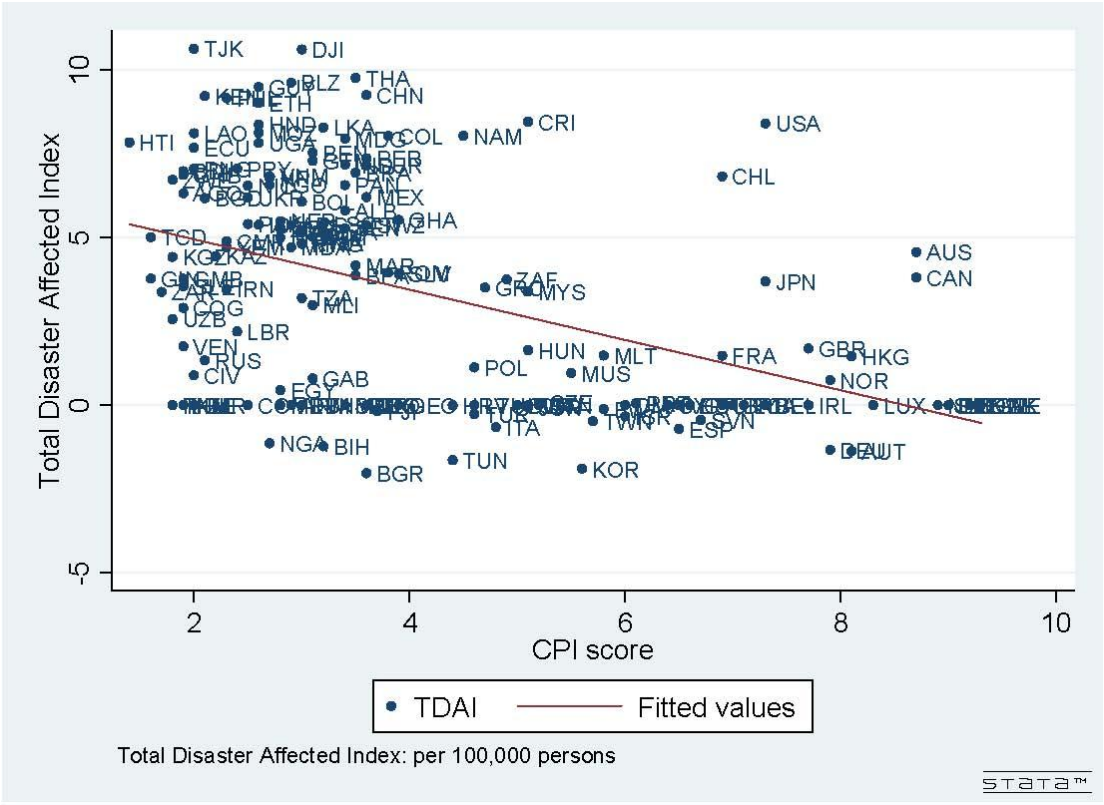

Figure 2: Transparency and Disaster Affected Index, 155 countries in 2008

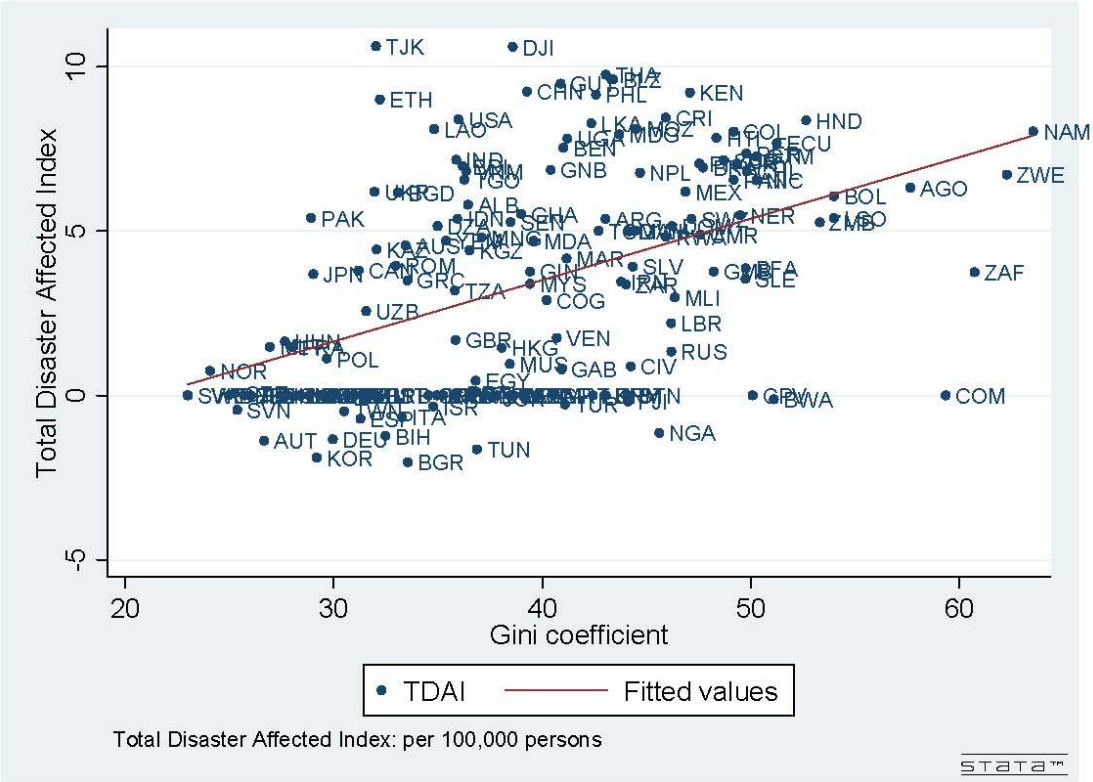

Figure 3: Income Inequality and Disaster Affected Index, 155 countries in 2008

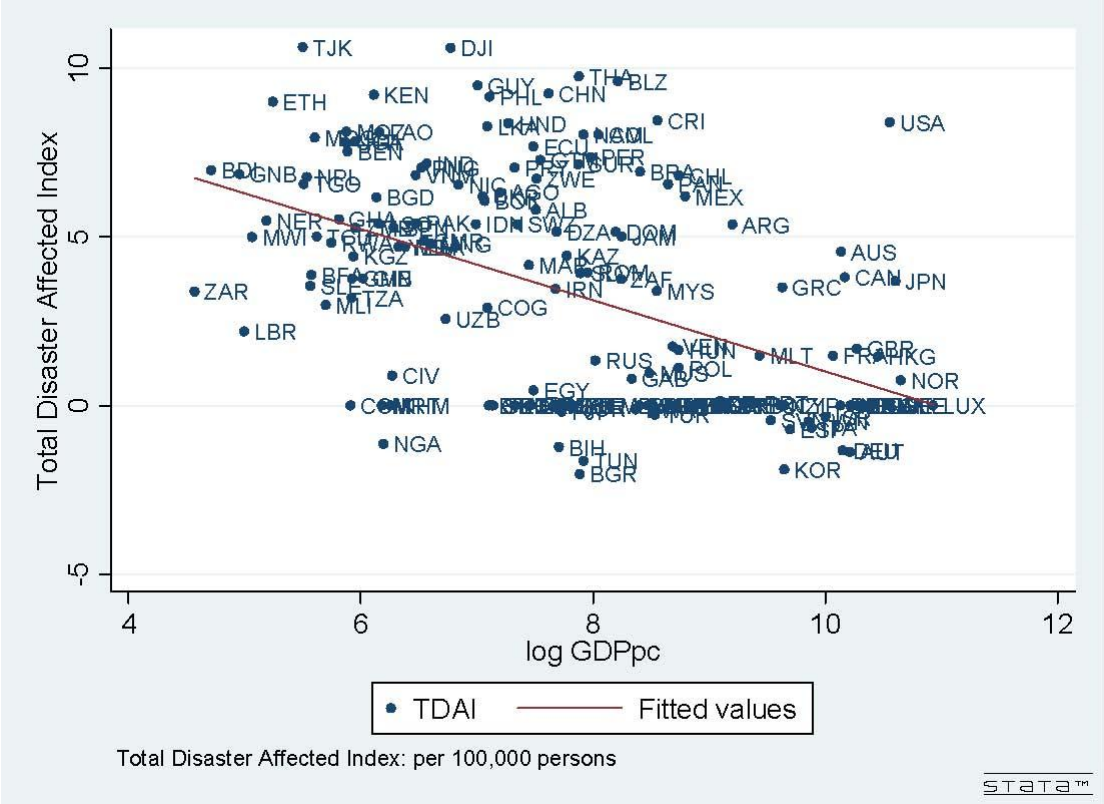

Figure 4: Economic Development and Disaster Affected Index, 155 countries in 2008

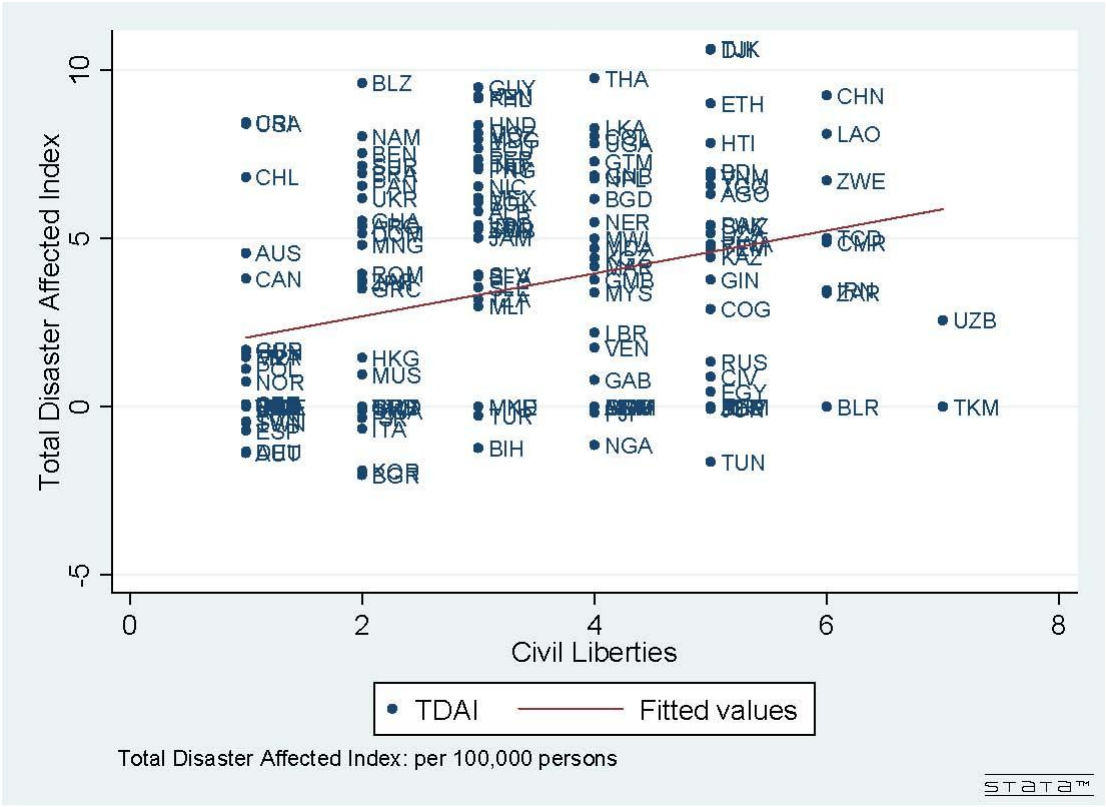

Figure 5: Freedom House's Civil Liberties (1=liberal, 7=illiberal) and Disaster Affected Index, 155 countries in 2008

References

"2010 Haiti earthquake," Wikipedia: http://en.wikipedia.org/wiki/2010_Haiti_ earthquake, accessed at Jan. 6, 2011.

Acemoglu, Daron, and James A. Robinson. 2005. Economic Origins of Dictatorship and Democracy. Cambridge: Cambridge University Press.

Aldrich , Daniel P. 2010. "The Power of People: Social Capital's Role in Recovery from the 1995 Kobe Earthquake" Natural Hazards DOI: 10.1007/s11069-010-9577-7

Aldrich , Daniel P., and Kevin Crook. 2008. "Civil Society as a Double-Edged Sword: Siting Trailers in Post-Katrina New Orleans." Political Research Quarterly 61(3): 379-389.

Amsden, Alice. 1989. Asia's Next Giant: South Korea and Late Industrialization. New York and Oxford: Oxford University Press.

Anbarci, Nejat & Escaleras, Monica & Register, Charles A., 2005. "Earthquake fatalities: the interaction of nature and political economy," Journal of Public Economics, 89(9-10): 1907-1933.

Bayard, Dominique. 2010 "Haiti Earthquake Relief, Phase Two -- Long-Term Needs and Local Resources." The New England Journal of Medicine. 362(20): 1858-1862.

TBräutigam, Deborah A., Odd-Helge Fjeldstad and Mick Moore. 2008. Taxation and State-building in Developing Countries: Capacity and Consent. TCambridge: Cambridge University Press.

Brooks, N.P P,W. N. Adger and P. M. Kelly. 2005. "The determinants of vulnerability and adaptive capacity at the national level and the implications for adaptation." Global Environmental Change Part A1 5(2):151-163.

Brown, David S., and Wendy Hunter. 1999. "Democracy and Social Spending in Latin America, 1980-92." The American Political Science Review, 93 (4): 779-790.

Burkle, Frederick M. Jr. 2006. "The Globalization of Disaster : Globalization and Disasters: Issues of Public Health, State Capacity and Political Action" Journal of International Affairs, Spring/Summer, 59(2): 241-265.

Cheibub, José Antonio. 1998. "Political Regimes and the Extractive Capacity of Governments: Taxation in Democracies and Dictatorships." World Politics 50: 349–376.

Chibber, Vivek. 2003. Locked in Place: State-Building and Late Industrialization in India. Princeton: Princeton University Press.

Cutter, S. L. 1996. "Societal Vulnerability to Environmental Hazards." International Social Science Journal 47 (4): 525-536.

Cutter, S.L., B. J. Boruff, and W.L. Shirley. 2003. "Social Vulnerability to

Environmental Hazards." Social Science Quarterly 84(1): 242-61.
Dahl, Robert A. 1972. Polyarchy: Participation and Opposition. Yale University Press.
Deng, Guoseng. 2009. Responding to Wenchuan: an Analysis on Relief Mechanims in China. Beijing: Peking University Press (in Chinese).
Diamond, Larry. 2002. "Think about Hybrid Regimes," Journal of Democracy Vol.13, No. 2: 33.
Donner, W. and Rodríguez, H. 2008. "Population Composition, Migration, and Inequality: The Influence of Demographic Changes on Disaster Risk and Vulnerability". Social Forces, 87(2): 1089-1114.
Drabek, Thomas E. 1986. Human System Responses to Disaster: An Inventory of Sociological Findings. New York: Springer-Verlog.
Escaleras, Monica, Anbarci, Nejat, Register, Charles A. 2007. "Public sector corruption and major earthquakes: A potentially deadly interaction," Public Choice, 132(1), 209-230.
Freudenburg, William R., Robert Gramling, Shirley Laska and Kai Erikson. 2009. "Organizing Hazards, Engineering Disasters: Improving the Recognition of Political-Economic Factors in the Creation of Disasters." Social Forces, 87 (2): 1015-1038.
Freedom House. 2010. "Country ratings and status, FIW 1973-2010." Accessed at: http://www.freedomhouse.org/template.cfm?page=439, Nov. 2, 2010.
Fritz, V. and A.R. Menocal. 2007. "Understanding State-Building from a Political Economy Perspective." Overseas Development Institute (ODI), London.
Fukuyama, Francis. 2004. State-building: Governance and World Order in the 21st Century. Ithaca, N.Y.: Cornell University Press.
Gadsden, Amy E. 2008. "Earthquake rocks China's civil society." Journal: Far Eastern Economic Review, 171(5): 25-29.
Gall, M., C. T. Emrich and S. L. Cutter. 2008." Toward a comprehensive loss inventory of weather and climate hazards." Pp. 279–295. in and H. F. Diaz and R. J. Murnane(ed) Climate Extremes and Society. Cambridge: Cambridge University Press.
Geddes, Barbara. 1994. TPolitician's Dilemma: Building State Capacity in Latin America. TBerkeley: University of California Press.
Girard, Philippe R. 2005. Paradise Lost: Haiti's Tumultuous Journey from Pearl of the Caribbean to Third World Hot Spot, New York: Palgrave Macmillan.
Girard, Philippe R. 2010. "Underdevelopment in Haiti," in Sally Paine, ed., Nation Building, State Building, and Economic Development: Case Studies and Comparisons, New York: M. E. Sharpe, 153-166.
Green, Penny. 2005. "Disaster by Design: Corruption, Construction and Catastrophe."

British Journal of Criminal, 45: 528-546.
Haggard, Stephan, and Robert R. Kaufman. 1995. The Political Economy of Democratic Transitions. Princeton, NJ: Princeton University Press.
Hass, J. Eugene, Robert W. Kates and Martyn J. Bowden (eds.). 1977. Reconstruction Following Disaster. Cambridge, MA: The MIT Press.
Hewitt, Kenneth. 1998. "Excluded perspectives in the social construction of disaster." Pp. 75-92 in E. L. Quarantelli (ed.), 1998, What is a Disaster? London: Routledge.
Huntington, Samuel P. 1991. The Third Wave: Democratization In The Late Twentieth Century. Norman: University of Oklahoma Press.
Jha, Abhas K., Jennifer Duyne Barenstein, Priscilla M. Phelps, Daniel Pittet, and Stephen Sena. 2010. Safer Homes, Stronger Communities: A Handbook for Reconstructing after Natural Disasters. Washington DC: World Bank.
Johnson, Chalmers. 1982. MITI and the Japanese Miracle. Stanford, CA: Stanford University Press.
Jones , E. C. and A. D.Murphy (ed). 2009. The Political Economy of Hazards and Disasters. Lanham: AltaMira Press.
Kahn, Matthew E. 2005. "The Death Toll from Natural Disasters: The Role of Income, Geography, and Institutions," Review of Economics and Statistics, 87(2): 271–284.
Kaur, Jagdish. 2006. "Administrative issues involved in disaster management in India" International Review of Psychiatry, 18(6): 553-557.
Keefer, Philip, Neumayer, Eric and Plumper, Thomas. 2010. "Earthquake Propensity and the Politics of Mortality Prevention," World Bank Policy Research Working Paper 5182.
King, Gary, James Honaker, Anne Joseph and Kenneth Scheve. 2001. "Analyzing Incomplete Political Science Data: an Alternative Algorithm for Multiple Imputation." American Political Science Review 95(1): 49-69.
Lau, Deb. 2010. "Disaster relief: helping the survivors of the Haiti earthquake" Emergency Nurse. 17(10):18-21.
Levi, Margaret. 1988. Of Rule and Revenue. Berkeley, CA: University of California Press.
Lieberman, Evans S.TT TT2002. "Taxation data as indicators of state-society relations: Possibilities and pitfalls in cross-national research." Studies in Comparative International Development, 36 (4): 89-115.TT
Lieberthal, Kenneth, and Michel Oksenberg. 1988. Policy Making in China: Leaders, Structures, and Processes. Princeton: Princeton University Press.
Lin, Thung-hong. 2010. "Politics of Reconstruction: A Case Study of Earthquake Relief in China." Paper Presented at the Annual Meeting Taiwanese Sociological Association, Taipei: Taiwanese Sociological Association, 2010-12. (in Chinese).

Maeda, Kiyoshi. 2007. “Twelve years since The Great Hanshin Awaji earthquake, a disaster in an aged society”. Psychogeriatrics 7(2): 41-43

McCarthy, J. D. and M. N. Zald. 1977. "Resource Mobilization and Social Movements: A Partial Theory." The American Journal of Sociology 82: 1212 - 1241.

Mileti, D. S. 1999. Disasters by design: a reassessment of natural hazards in the United States. NW: Joseph Henry Press.

Mistry, Ravi, Weimin Dong and Haresh Shah. 2001. Interdisciplinary Observations on The January 2001 Bhuj, Gujarat Earthquake. World Seismic Safety Initiative/Earthquakes and Megacities Initiative, access at: http://www.rms.com/publications/Bhuj_EQ_Report.pdf, 2010/09/09.

Munck, G. L., and Jay Verkuilen. 2002. “Conceptualizing and Measuring Democracy: Evaluating Alternative Indices.” Comparative Political Studies 35 (1): 5-34.

Nakamura, Akira. 2000. “The Need and Development of Crisis Management in Japan’s Public Administration: Lessons from the Kobe Earthquake,” Journal of Contingencies and Crisis Management,8(1): 23-29.

Neumayer, Eric and Barthel, Fabian. 2011. “Normalizing Economic Loss from Natural Disasters: A Global Analysis” (2010). Global Environmental Change, 21(1). Available at SSRN: http://ssrn.com/abstract=1720414

North, Douglass C. 1990. Institutions, Institutional Change and Economic Performance. Cambridge: Cambridge University Press.

Noy, Ilan, 2009. "The macroeconomic consequences of disasters," Journal of Development Economics, 88(2): 221-231.

OECD. 2008. State Building in Fragile States. London: Kogan Page.

Oliver-Smith, A. 1996. ”Anthropological Research on Hazards and Disasters.” Annual Review of Anthropology 25 (1) : 303-328.

Organization for Economic Co-operation and Development (OECD). 2003. China in the World Economy: an OECD Economic and Statistical Survey. London: Kogan Page.

Ö zerdem, Alpaslan, and Tim Jacoby. 2006. Disaster Management and Civil Society: Earthquake Relief in Japan, Turkey and India. London, New York: I.B. Tauris.

Pierre, Hyppolite. 2006. “Civil Society in Contemporary Haitian Politics.” Institute for Research in Socioeconomic and Public Policy (IRSP): http://www.irsp.org/culture-05.htm, accessed at Dec. 21, 2010.

Przeworski, Adam, Michael E. Alvarez, Jose Antonio Cheibub, and Fernando Limongi. 2000. Democracy and Development; Political Institutions and Well-Being in the World, 1950-1990. New York: Cambridge University Press.

Quarantelli, E. L. (ed.). 1998. What is a Disaster? Perspectives on the Question.

London: Routledge.
Rodriguez, Havidan, Tricia Wachtendorf, James Kendra, Joseph Trainor, (2006) “A snapshot of the 2004 Indian Ocean tsunami: societal impacts and consequences”, Disaster Prevention and Management, 15 (1), pp.163–177.
Rose-Ackerman, Susan. 1978. Corruption: a Study in Political Economy. New York: Academic Press.
Rubin, D. B. 1976. “Inference and Missing Data.” Biometrika 63: 581-92.
Sen, Amartya. 1981. Poverty and Famines: an Essay on Entitlement and Deprivation. Oxford: Oxford University Press.
Sen, Amartya. 1999.T TTDevelopment as FreedomT. New York: Knopf. T
Stalling, Robert A.. 2002. “Weberian Political Sociology and Sociological Disaster Studies.” Sociological Forum 17 (2): 281-305.
Teets, Jessica C. 2009. "Post-Earthquake Relief and Reconstruction Efforts: The Emergence of Civil Society in China?" The China Quarterly 198: 330-347.
The City of Kobe. 2009. The Great Hanshin-Awaji Earthquake Statistics and Restoration Progress. Access at the website of The City of Kobe: http://www.city.kobe.lg.jp/safety/hanshinawaji/revival/promote/img/january.2009.pdf, 2010/09/09.
Tilly, Charles. 1990. Capital, Coercion and European States. Cambridge, MA: Basil Blackwell.
Tilly, Charles. 2007. Democracy. Cambridge: Cambridge University Press.
Transparency International. Corruption Perceptions Index (CPI) 2010. “Transparency International” http://www.transparency.org/policy_and_research/surveys_indices/cpi.
Wade, Robert. 1990. Governing the Market: Economic Theory and the Role of Government in East Asian Industrialization. Princeton: Princeton University Press.
Wisner, B., P. Blaikie, T. Cannon, and I. Davis. 2004. At Risk: Natural Hazards, People's Vulnerability and Disasters. NY: Routledge.
Wong, C.P.W., Heady, C., and Woo, W.T. 1995. Fiscal Management and Economic Reform in the People’s Republic of China.T Oxford University Press, Hong Kong.
World Bank. 2010. “World Development Indicators”: http://devdata.worldbank.org/data-query/.
Wu, Xiaogang and Donald J Treiman. 2007. “Inequality and Equality under Chinese Socialism: The Hukou System and Intergenerational Occupational Mobility”, TAmerican Journal of SociologyT 113(2):415-45.
Yang, Dali L. 2004. Remaking the Chinese Leviathan: Market Transition and the Politics of Governance in China. Stanford, CA: Stanford University Press.