Disaster Relief: Drivers of Countries around the Globe Contributing towards Disaster Donations

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Abstract

The paper discusses the foreign responses after the three most devastating natural catastrophes of this century affecting individual countries, namely Hurricane Katrina in US, the Wenchuan Earthquake in China and the Haiti Earthquake. A two-staged process is used to analyse disaster aid decisions. The results from the cluster analysis show that out of 194 countries around the world, 35 were preferentially US-oriented, 47 Haiti-oriented, 33 China-oriented, 33 did not have any explicit orientation and 32 did not extend any assistance. The results from the analysis confirm the existent evidence of geographies of generosity which shows geopolitical orientation with the North American countries more likely to donate to US and the Asian countries to China. Haiti however did not have any particular appeal to the North American continent. The countries which are seen to implement a pure humanitarian approach to disaster aid have higher per capita GDP and general government consumption expenditure which means that foreign assistance depends on the state of the economy and larger public sector. A country with a higher human development index (HDI) is also more likely to grant donation. After a detailed examination of the motives behind international relief, the paper puts forward the need for a Global Information Network (GIN) that can assist in coordinating disaster activities, making them more transparent and improve the channels of communication.

Keywords: disaster donations; disasters relief; Hurricane Katrina; Wenchuan Earthquake; Haiti Earthquake

1. Introduction

With growing population and supporting infrastructure the world's exposure to natural disasters is inevitably increasing (Bournay, 2007). Improvements in technology and information dissemination position us better to register and report hazardous events but also to account for the damages caused. Statistical data about total losses due to natural disasters show a dramatic increase during 1994-2003 (Peng et al., 2009). Every year, a number of disasters occur and through the power of the media, they attract global attention. Nearly in every given year in the 21st century, "there are more than 700 natural catastrophic events, resulting in billions of dollars of damage and asset loss, and unquantifiable human suffering" (Rumbaitis del Rio, 2012, p.327). In 2010 alone, natural disasters of various types caused the death of at least 250,000 people, which exceeds the number of victims killed in terrorist attacks in the past 40 years combined (US Federal Emergency Management Agency in CBS News). The predictions about the future are also bleak. For example, by 2015 it is expected that the number of people who will need to be rescued from natural catastrophes will rise to 375,000 as more hurricanes, typhoons, floods, heatwaves, droughts, blizzards and landslides triggered by climate change add to the toll caused by earthquakes, volcanoes and human-made disasters (Borger, 2010).

Once a large disaster strikes a country, it always exceeds its economy's ability to meet the need for reducing the exposure to risks and reconstruct the infrastructures during the recovery process (Linnerooth-Bayer et al., 2005). Aid for emergency relief and reconstruction[1] plays provides much-needed funds to governments and individuals in such times of hardship. Disaster aid from governments and non-governmental actors of foreign countries, providing cash and resources, plays an important role to ensure the survivors' opportunity to rebuild their lives and hopefully increase their resilience given the risk of future disasters (Alexander, 2006). There has been increasing international cooperation in response to natural disasters and assistance from the global community has effectively helped the

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[1] We understand disaster and postdisaster aid/assistance/help/relief/donation interchangeably as describing the support provided to those affected by natural disasters.

recovery of many disaster-stricken countries and their people. The aid from the international community, including foreign governments and international agencies, in particular recognises the need to mitigate and reduce losses caused by natural disasters (Board on Natural Disasters, 1999). Not only developing countries (e.g. India, China and Afghanistan) but also developed countries (e.g. US and New Zealand) have needed and received international assistance when affected by devastating disasters. Each natural calamity is unique in its gravity and local circumstances. However when a fatal catastrophe occurs, is the response from the international community similar or does it vary depending on which is the disaster-stricken country and how powerful its economy is? What factors affect the provision of humanitarian aid and other assistance?

In the past decade, fatal natural calamities including earthquakes, hurricanes and floods occurred in the world every year. Estimates of lives taken and damage caused vary and often impacts are complex and compiled. According to cost, injuries inflicted and claimed lives, the insurance industry considers the 7 worst natural disasters of the 21st century to be: (1) the 2010 Haiti earthquake; (2) the 2004 Indian Ocean tsunami affecting Sri Lanka, Indonesia, Thailand, India, Bangladesh, Myanmar, Maldives and Malaysia; (3) the 2008 Wenchuan earthquake in China's Sichuan province (also referred to as the Sichuan earthquake); (4) the 2008 Cyclone Nargis destroying Myanmar; (5) the 2005 Kashmir earthquake affecting Pakistan, India and Afghanistan; (6) the 2003 European heatwave impacting most severely France, Italy and Germany but felt throughout the entire continent; and (7) the 2005 Hurricane Katrina affecting seriously Louisiana, Mississippi, as well as other areas in the South of USA (Insurance Information Institute in Mitchell, 2011). Three of these severe calamities (the Indian Ocean tsunami, the Kashmir earthquake and the European heatwave) were multilateral, impacting more than one country, and the reaction from the global aid community to each individually affected economy is blurred by the wider international context of the disasters. Analysing Cyclone Nargis is a very interesting task from the point of view of national, international and global politics. Despite immediate offers of help, the Government of Myanmar (Burma)

initially refused any assistance, then softened up and reluctantly accepted some belayed international aid. According to Paik (2011), this was due to the national government's perception of a high risk associated with accepting international aid that could potentially influence the internal affairs of the country.

The remaining three disasters are very similar in the sense that the national governments reached out and were willing to accept disaster assistance straight away. However, the countries that were affected are very different: the 2005 Hurricane Katrina hit the biggest developed economy – USA, the 2008 Wenchuan Earthquake occurred in the most populous country and the strongest emerging global economy – China, while the 2010 Haiti Earthquake stroke one of the poorest countries in the world – Haiti. All three disasters aroused large global donation campaigns, as shown in Table 1. Despite these being three specific cases, there is a lot that can be learned about disaster relief drivers from the scale of these events.

Table 1 Global donations to Hurricane Katrina, Wenchuan Earthquake and Haiti Earthquake

Variables	Hurricane Katrina (2005)	Wenchuan Earthquake (2008)	Haiti Earthquake (2010)
People killed	1800	69197	over 230,000
Damages (billion US$)	81	130	14
The amount of donations (million US$)	862.34	218.99	2258
Number of donors	106	124	107

Data sources: Financial Tracking Service (http://fts.unocha.org/); Bilham, 2010; http://news.163.com/09/0506/11/58KLK09B00011SM9.html; http://www.washingtonpost.com/wp-dyn/content/article/2010/02/16/AR2010021605745.html (Accessed 15 October 2012).

The 7.0 magnitude Haiti Earthquake was the worst from the three disasters causing the death of over 230,000 people. The country was still recovering from the deadly 2008 hurricanes when the quake struck. Due to the poor building standards, substandard infrastructure and decades of unsupervised construction permitted by the

government (Bilham, 2010), the catastrophe was exceptionally devastating with millions of survivors left without a shelter. The direct economic damage is estimated at US$8.1 billion (Cavallo et al., 2010) or equal to 129% of Haiti's 2009 GDP (UNdata, 2012). In the days following the earthquake, 107 countries responded quickly offering disaster relief to Haiti. The pledges of financial aid and other assistance reached over US$2258 million.

The official figures for the 7.9 magnitude 2008 Wenchuan Earthquake state that 69,197 people were confirmed dead, 374,643 injured, 18,341 missing and 4.8 million people were left homeless (Ministry of Civil Affairs of China, 2008). The large magnitude of the earthquake and mass media attention soon caused foreign nations and organisations to respond by extending sympathy and humanitarian aid. Altogether 124 countries expressed diplomatic condolences and offered assistance to China. The total amount of foreign government assistance was over US$200 million, though a large portion of the aid was not immediately claimed (Ministry of Foreign Affairs of China, 2008).

In the history of the United States, Katrina was the costliest hurricane as well as one of the five deadliest (Knabb et al., 2005). The 2005 Hurricane Katrina killed more than 1,800 and more than US$81 billion loss in damages occurred (Knabb et al., 2005; US Department of Commerce, 2006). Although the US economy has a strong ability to tackle disasters, it also requested specific additional assistance from the national or international community when the local government of the disaster-stricken area exhausted its resources. In total, 106 countries and more than a dozen international organisations offered their assistance. The total aid offered by foreign countries was over US$800 million, though a large portion of it was not immediately collected, including over US$400 million in oil (US Department of State, 2006; Solomon and Hsu, 2007).

When a massive disaster occurs, quick and extensive relief assistance can reduce significantly human and property losses. However, the situation of disaster aid is complex. Among the three disasters analysed here, the Haiti Earthquake received the most donations from the global community because of its extensive

damages and the weakness of the country's economy. On the other hand, China received a smaller donations amount than that offered to the US despite the fact that the Wenchuan Earthquake caused much more damage than Hurricane Katrina. In the latter two cases, a philanthropic attitude cannot fully explain the difference in the donation behaviour of the international community. Existing studies have already argued that international assistance in disaster relief is strongly strategic, political and driven by economic considerations (Olsen et al., 2003; Berthélemy and Tichit, 2004; Drury et al., 2005).

This paper examines the foreign disaster aid for US – the largest developed country, China – the largest developing country, and Haiti – the poorest country in the Western hemisphere and tests the differences in international assistance. When the three countries were stricken by these massive natural disasters, what were the drivers which affected global relief contributions? We examine foreign postdisaster help as two sets of decisions: (1) the decision of granting disaster aid; and (2) the actual amount (size) of the disaster aid.

The remainder of the paper is organised as follows. Section 2 reviews literature about foreign assistance in disaster relief. The methodology and data used for the study are presented in Section 3. Section 4 describes the data analysis and examines what determines disaster aid. Concluding remarks are provided in Section 5.

2. Literature review

International assistance is a robust area of research interest. In essence, many studies show that any foreign aid decisions are multi-faceted and involve considerations about the recipient country's economic and social development potential, political and diplomatic impact, geo-strategies and the donor state's economic benefits. The study by Berthélemy and Tichit (2004) concludes that there is evidence of self-interest in supporting trading partners, particularly for smaller donor countries, and that on average donors condition their contributions on the positive social and economic performance of the recipient countries.

Nations always have significant incentives to maximise their power in

international relations (Morgenthau, 1978) and this is also the case in the field of disaster relief (Zhang, 2006). Many studies show that foreign assistance to the disaster-stricken country is overwhelmingly political. People and institutions are inevitably grounded in culture and politics (Wedel, 2005) and foreign assistance for disaster relief is mainly determined by political considerations (Nushiwat, 2007). For example, US foreign humanitarian aid has been proven to be strongly political in the granting and allocative stages guided by three basic types of consideration: US foreign policy concerns or reservations about the potential recipient state, domestic US political concerns, and domestic politics within the potential recipient state (Drury et al., 2005). In emergency operations in Afghanistan, the level of financial assistance depended on the degree of political, and in particular security, interests that aid-funding governments have in the region or country where the humanitarian crisis occurs (Olsen et al., 2003).

More recently the discussion about disaster relief widened to include the use of humanitarian aid as a diplomatic tool (Kelman, 2007; Kelman, 2012). The evidence available from studying Aceh following the 2004 Asian tsunami suggests that inter-state and intra-state disaster diplomacies are similar, irrespective of the players involved, and that disaster diplomacy is similarly limited in resolving decades-long conflicts and achieving peace (Gaillard et al. 2008).

The nature of the disasters themselves also affects donor responses and the decision to grant assistance. In the 1964–1995 US foreign disaster aid, droughts were more likely to be granted aid than other disasters (Drury et al., 2005). The level of news coverage in domestic media substantially influences aid relief (Olsen et al., 2003; Potter and Van Belle, 2008). The study by Eisensee and Strömberg (2007) shows that the news effect of disaster coverage can be significantly reduced if there is a "competing" event, such as Olympic Games.

In the case of foreign assistance to US after Katrina, many international donors expressed frustration over slow reaction and legislative delays (for nearly a week after help had been offered) in shipment approvals (Chua et al., 2007). Faced with a crisis of enormous proportions, China was very quick in accepting humanitarian

assistance (Paik, 2011) but the analysis by Haojun et al. (2011) of the on-site rescue operations in the aftermath of the Wenchuan Earthquake reveals inadequate field resources, poor first-aid knowledge and inept management by all responsible departments. The civil-military cooperation in the initial medical response to the Haiti earthquake had a lot of challenges too, including dealing with the chaos and profound social disruption in the absence of clear communication channels between relief workers but also to family members and particularly children separated from their parents (Auerbach et al., 2010). The challenge of providing effective aid with highly limited resources under extreme time pressure justifies the calls for a global information network (GIN) that is capable of retrieving and fusing data into useful information in order to the support humanitarian assistance and disaster relief by international agencies (Mak et al, 1999). According to Bui et al., (2000), to design such a GIN whose capabilities should go beyond information gathering and dissemination, four key factors need to be taken into consideration, namely the nature of the humanitarian assistance/disaster relief itself, the social, cultural and organisational context, impact of scarce resources and the negotiation style among participating agencies.

Spatial location is a privileged topic in geography discussions about the moral philosophy of aid, including disaster donations, where "distance" is associated with attributes, such as justice, universality and impartiality while "proximity" implies particularity and partiality (Barnett and Land, 2007). Some geographers debate the so-called "geographies of generosity" or the practices of giving and receiving aid, focusing on the themes of: (1) "caring at a distance" which grounds aid to the theories of equality and social justice; and (2) "geographies of responsibility" which link aid to attentiveness and responsiveness that start from those who are the nearest and dearest to us but can be extended to the globalised world (Barnett and Land, 2007; Massey, 2004). Geographies of generosity can refer to the study of different aspects of care where new modes of spatial relationships emerge and practices reveal the multiple and complex motivations for help following the occurrence of natural disasters and/or political emergencies (Barnett and Land, 2007; Carter, 2007;

McEwan and Goodman, 2010). This new field already offers a range of studies that analyse the moral grounds of aid in relation to extreme and intense situations, such as the Asian tsunami (Korf, 2007; Clark, 2007).

In the 21st century, spatial distance has become much more fluid (Korf, 2007), which has made disaster assistance more cosmopolitan. Since there is no international mechanism to ensure that global communities offer assistance to the disaster-stricken countries, global cosmopolitanism is asserted to be the moral grounds for dealing with disasters (Brooks, 2002). According to Calhoun (2008, p. 427), "(c)osmopolitanism has become an enormously popular rhetorical vehicle for claiming at once to be already global and to have the highest ethical aspirations for what globalisation can offer". The disaster responses from the global community therefore have become part of the argument about cosmopolitanism, advocated by social sciences in the 1990s (Featherstone, 2002; Pollock et al., 2000). In the disaster responses of donor countries, cosmopolitanism and nationalism cannot be sharply juxtaposed; also cosmopolitanism is often framed through national interests (Kyriakidou, 2009).

Existing studies also compare the performances and incentives of donor countries. McGillivray (1989) measured the relative aid giving performance of relief donors in terms of the inter-recipient distribution of their aid. The performance was calculated using the per capita allocations to a sample of 85 recipient countries in the years 1969–1984. The results indicate that the performance of four countries, namely Belgium, Finland, Denmark and Norway, was generally superior to that of the other donors. Using a large panel dataset, Harrigan and Wang (2011) found that all donors respond to recipient need in their allocation of aid, but that the US puts more emphasis on donor–recipient linkages than the other donors do. This is another study suggesting that the US attaches greater importance to issues of donor interest, such as geopolitical, commercial and other links with specific recipients. In the campaigns for disaster donation, some non-traditional donor countries, such as China, India and North Korea offer assistance on a unique scale in disaster history (Gaillard et al., 2008). Woods (2008) even talks about a silent revolution in economic assistance

where new players from emerging economies (e.g. United Arab Emirates and Saudi Arabia) are becoming more prominent with their aid being more generous and more attractive. By employing Probit and Tobit models and test for significant differences in the distribution of aid by new and old donor countries across recipient countries, Dreher et al. (2011) come to the conclusion that the new donors are not that different from the old and neither their critics or optimists about better targeted aid can be supported.

Most of the extant studies attempt to analyse individual donor countries to examine what determines their disaster aid to disaster-stricken economies. However, this study concentrates on the motivation behind donors in the case of three distinctive and grave natural disasters. By examining the drivers behind the international relief donations in the cases of Hurricane Katrina, Wenchuan Earthquake and Haiti Earthquake, it also demonstrates the need for a Global Information Network.

3. Methodology and data

The aim of this study is to statistically analyse the drivers of countries around the globe to contribute towards disaster relief in the case of the 2005 Hurricane Katrina in US, the 2008 Wenchuan Earthquake in China and the 2010 Earthquake in Haiti. A country is considered a disaster aid donor if its government pledged to provide disaster aid for these events to the government of US, China or Haiti. Section 3.1 to follow presents the theoretical model while sections 3.2 and 3.3 elaborate on the variables and data used.

3.1 Theoretical framework

We borrow Drury et al. (2005)'s two-stage process to estimate the response to Hurricane Katrina, Wenchuan Earthquake and Haiti Earthquake. The first stage is the decision of granting disaster aid. The second stage is the decision as to how much resource to allocate. We use the decision of granting disaster aid to classify the countries and use the Multi-logit method to test the determinants of granting disaster

aid. The second stage is the decision about the assistance amount that obviously comes into play only if the first decision is positive. Ordinary Least Squares (OLS) liner regression is applied to estimate the influence of the various variables on the variables describing how much assistance to donate.

3.2 Dependent variables and data

We use two dependent variables to gauge the two-stage donation process. In the first stage, the dependent variable is the decision to grant disaster aid. If a country pledged to provide assistance (cash or in-kind) to the disaster-stricken countries, we identify the granting decision as positive, and code it as 1. If not, the granting decision is coded as 0. If the assistance response is positive, then the question becomes as to how much assistance is provided. In the three cases (Hurricane Katrina, Wenchuan Earthquake and Haiti Earthquake), the variable of the amount of foreign government assistance (in 10 thousand US dollars) represents how much assistance is allocated. This is the second dependent variable.

The data for the two variables in this research are collected from "Summary of Foreign Assistance Received or Expected to Date" (US Department of State, 2005), Total Humanitarian Funding per Donor in 2008 for Wenchuan Earthquake and Total Humanitarian Funding per Donor in 2010 for Haiti Earthquake (FTS, 2012) from the website of Financial Tracking Service (FTS). The latter is a global, real-time database which records all reported international humanitarian aid (including that for NGOs and the Red Cross/Red Crescent, bilateral aid, in-kind aid and private donations), managed by the UN Office for Coordination of Humanitarian Affairs (OCHA). All FTS data are provided by donors or recipient organisations. The monetary value of supplies is calculated according to the pledged worth or volume of provided supplies. The figures for the amount of donation given by one country to another represent the official disaster assistance which was pledged by the government of the donor country and do not include the private donations.

3.3 Independent variables and data

The factors which influence foreign relief to a disaster-stricken country include geographical characteristics, economic development, social advance and trading relationships together with other social cognitive factors. For the purpose of this study based on data availability, we use the former four dimensions to examine the drivers of humanitarian assistance for these three disasters.

Geographical place. Distance is an impediment to generous responses to the needs of others and carrying out relief actions (Barnett and Land, 2007). The distance between countries is an important factor in geopolitics (Agnewa, 2006) and for the geographies of generosity (Korf, 2006; Barnett and Land, 2007). Distance always determines the type of assistance provided; for example, neighbouring countries are more likely to donate supplies. This study tries to draw on a range of perspectives concerning the relationships between the global disaster assistance and the themes of 'caring at a distance' and 'geographies of responsibility' in the aftermath of the three disasters. We introduce geographical place in the model by using an indicator representing whether the donor country and the disaster-stricken country are in the same continent. Hurricane Katrina and the Haiti Earthquake happened in North America. Although Haiti is located on the Greater Antilles and is a Caribbean country, geographically it belongs to the North American continent (World Atlas, 2012). The Wenchuan Earthquake occurred in Asia. Hence, two dummy variables are used – one for Asian and the other for North American country.

Economic development. The level of economic development influences foreign aid to other countries (Drury et al., 2005) with developed and developing countries playing different roles in international disaster relief. Developed countries are seen to have more responsibility for humanitarian assistance than developing economies (Linnerooth-Bayer et al., 2005). The following three variables are used to measure the economic development of a particular country: gross domestic product (GDP), per capita GDP and general government final consumption expenditure. Gross domestic product and GDP per capita are the most commonly used indicators of development with GDP measuring the whole production (the unduplicated value

of goods and services produced or value added) occurring within an economy for a period of time (e.g. a year) and GDP per capita representing the relative production per person (ABS, 2000). Despite being measures of production and not economic welfare, these two indicators are important as they indicate how much a country can afford to consume (ABS, 2000), including investing in for future development, in the weakest within society as well as assist the international community. General government final consumption expenditure is an indicator used by the World Bank to compare countries and "includes all government current expenditures for purchases of goods and services (including compensation of employees). It also includes most expenditures on national defence and security, but excludes government military expenditures that are part of government capital formation" (The World Bank, 2012, n.p.). This indicator reflects the country's official government ability to provide foreign assistance.

Social advance. The social situation in a can influence its government ability to provide foreign assistance. For example, a country with higher unemployment rates has urgent social problems to resolve, which implies that its government would be more concerned about civil than foreign affairs. We measure the dimension of social advance by two variables: population and Human Development Index (HDI). Population size is important as a country with a large population always has more supplies for disaster relief. Combining indicators of life expectancy at birth, educational attainment and income, HDI is a relatively new way of measuring social advance (UNDP, 2011). It represents a single statistic which serves as a reference frame for both social and economic development: "The HDI sets a minimum and a maximum for each dimension, called goalposts, and then shows where each country stands in relation to these goalposts, expressed as a value between 0 and 1" (UNDP, 2011, n.p.). People's capabilities as emphasised by HDI determine to a great extent a country's ability and willingness to provide humanitarian disaster relief.

Trading relationships. Based on all previous research which emphasises geopolitics and self-interest in disaster assistance, we include trading relationships as part of the model. We measure them using two variables: export to disaster-stricken

country and import from disaster-stricken country, which are useful economic representation of the connections between countries.

All independent variables used in the model together with their measures are shown in Table 2. The data for the nine variables are collected from the database of the United Nations (http://data.un.org/); for we use respectively 2004, 2008 and 2010 data for Hurricane Katrina, Wenchuan and Haiti Earthquake. The number of countries included, for which relevant data are available, is 194 (including US, China and Haiti).

Table 2 Independent Variables Used In the Models

Dimensions	Independent Variables
Geographical place	Asian country (=1 if the country is an Asian country, 0 if not an Asian country)
	American country (=1 if the country is a North American country, 0 if not a North American country)
Economic development	Gross Domestic Product (GDP), million US$
	Per capita GDP (PGDP), US$
	General government final consumption expenditure (GGFCE), million US$
Social advance	Population, 10 thousands people
	Human Development Index (HDI)
Trading relationships	Export to disaster-stricken country (Export), million US$
	Import to disaster-stricken country (Import), million US$

4. Results and discussions

4.1 Classification of countries

In times of tragic disasters occurring abroad, many countries respond in a charitable way to their urgent humanitarian needs. In the case of the three catastrophic events analysed here, 59 countries provided relief to all the affected countries (namely US, China and Haiti) and 32 countries did not provide assistance to any of the disaster-stricken countries. We describe the former group as 'extensive' donation countries and the latter as 'devoid' donation countries. The response from the extensive donors already indicates cosmopolitanism in their disaster response (Featherstone, 2002; Pollock et al., 2000) since they appear to be already global and have the highest ethical aspirations in globalisation (Calhoun, 2008). However, more than half of all

countries, namely 103 of them provided humanitarian relief to only one or two of the three disaster-stricken countries. We describe the 55 countries which provided relief twice as 'selective' donors as they chose two of the three disaster-stricken countries as recipients of their relief according to factors, such as the severity of the disaster, disaster recover ability and others. The remaining 48 countries provided disaster relief only to one country (US, China or Haiti) and we describe them as 'focused' donors displaying more egoistic behaviour in foreign assistance. The classification of the foreign countries dependent on their donation behaviour is presented in Table 3. Despite providing assistance in two of the three cases (and being recipients in the third), China and US are classified as extensive donors based on their active assistance behaviour in other significant disasters that have occurred in the past ten yeas. Haiti is classified as devoid.

Table 3 Classification of countries based on disaster donations

Donation Type	Extensive	Selective	Focused	Devoid
Donation times	3	2	1	0
Number of countries	59	55	48	32

Note: US and China are classified as extensive donors based on their active assistance behaviour in other significant disasters that have occurred in the past yeas. Haiti is classified in the devoid category.

The question that arises is what determines the countries' different responses to the disaster needs. We use the Multi-logit method to estimate the determinants of the four types of disaster donation responses using SPSS14. The independent variables are Asian country, North American country, lnGDP, lnPGDP, lnPeople, lnGGFCE, and HDI. The model fitting information is that the Chi-Square is 118.073 and α (Significance) is at 0.000 level which means that the model fits the sample data very well. The estimate results are shown in Table 4.

Table 4 Parameter estimates of the classification of countries based on disaster donations

Explanatory Variables	Devoid Donation time=0		Focused Donation time=1		Selective Donation time=2	
	Coefficient [a]	SE [b]	Coefficient	SE	Coefficient	SE
Intercept	10.2061	6.9973	16.3946**	6.5753	3.6696	5.9383
Asian country	-0.9732	0.9273	-0.4278	0.6095	0.3421	0.4678
North American country	2.0136**	0.8782	1.3574*	0.8168	0.6640	0.7986
lnGDP	-1.3186	1.3122	0.5497	1.1844	-0.8848	1.0449
lnPGDP	0.6159	1.3675	-1.4457	1.3166	0.3558	1.1523
lnPopulation	0.2158	1.3753	-1.1819	1.2465	0.5898	1.1265
lnGGFCE	0.4366	0.5136	0.0590	0.4411	0.0218	0.4018
HDI	-11.1806***	4.2029	-4.4170	3.7986	-2.1074	3.5731
Number of observation	32		48		55	

Note: The reference category is: Extensive donation type (donation time=3) (N=59)...

[a] *,**, *** mean statistically significant at 10%, 5% and 1% level respectively.

[b] SE – standard error.

The results show that the American countries and the countries with lower HDI have no incentive to provide assistance to the disaster-stricken countries compared to the countries from the extensive donation type. However, there is no significant effect to distinguish the donor countries from the extensive, selective and focused categories (except the weak significance of the North American focused countries). These estimation results do not allow us to describe the characteristics of the selective and focused compared to the extensive donation type countries. Hence, we need to construct another model to explore the disaster donation responses by foreign countries in time of disaster.

4.2 Determinants of the donation orientation

As already described, the global community showed different donation behaviour to the three disaster-stricken countries. Here we introduce a vector donation = [U, H, C], which represents the donation combination of a country in response to the three disasters; U, H, and C represent a country's shares of its total aid provided to US, Haiti and China respectively. We apply Cluster Analysis using SPSS14 to group all

donor countries (excluding the devoid countries). According to the sample characteristic, we selected the Between-groups linkage as the cluster method, and the Cosine as the interval. The clustered results show 7 clusters (excluding the devoid countries). Three of the clusters present significant evidence of orientation towards respectively US, China and Haiti. According to the clustered results, if over 80% of the total relief by a country for the three disasters is donated to US, it belongs to the US-oriented cluster. The China- and Haiti-oriented clusters are similarly defined. We merged the remaining four clusters into a mix-oriented group where there is no significant evidence in donation orientation to one of the three disaster-stricken countries.

The final clustered results are presented in Table 5. There are 35 US-oriented countries, 47 Haiti-oriented countries, 33 China-oriented countries, 47 mix-oriented countries and 32 devoid countries. These results manifest that the countries around the globe have various disaster aid orientations, which yet again indicates that international assistance in disaster relief is influenced by foreign policy interests (Olsen et al., 2003; Drury, 2005). Hence, it is interesting to estimate what determines the decisions made for disaster donation orientations.

Table 5 Clusters of countries based on the donation orientation

Clusters	*Number of countries*
US-oriented	35
Haiti-oriented	47
China-oriented	33
Mix-oriented	47
Devoid	32
Total	194

We use the multi-logit method to model the determinants of disaster donation orientations, and the reference category is mix-oriented countries. Table 6 displays the estimated results. The coefficients represent the effect of each explanatory

variable on the ratio of the probability of the decision on the type of disaster aid, relative to the probability of mix-oriented donation. For the estimated model, Chi-Square is 101.511 and α (Significance) is at 0.000 level indicating that the model fits the sample data very well.

Table 6 Determinants of disaster donation orientation

Explanatory Variables	US-oriented		Haiti-oriented		China-oriented		Devoid	
	Coefficient [a]	SE [b]	Coefficient	SE	Coefficient	SE	Coefficient	SE
Intercept	15.8669***	6.8947	7.2126	6.8072	19.1664 ***	7.1334	10.7870*	6.2885
Asian country	0.3761	0.5337	-1.8672***	0.6956	0.4754	0.5555	-1.0392	0.9041
North American country	1.4144*	0.9077	1.1632	0.8348	-0.2921	1.3008	2.0268**	0.9297
lnGDP	1.1686	1.1855	1.1023	1.2783	1.3408	1.2426	-0.4205	1.1663
lnPGDP	-2.8299**	1.3826	-1.4024	1.3714	-3.4094**	1.4569	-0.4271	1.2117
lnPopulation	-2.3298*	1.2962	-1.5451	1.3555	-2.4568 *	1.3395	-0.8461	1.2364
HDI	3.2494	3.6801	0.1324	3.4242	4.9196	3.7205	-7.1534**	3.6751
lnGGFCE	0.9841**	0.5210	0.4092	0.4008	0.8804 *	0.5255	0.8110*	0.5086
Number of observation	35		47		33		32	

The reference category is: **mix-oriented (N=47)**.

[a] *,**, *** mean statistically significant at 10%, 5% and 1% level respectively.

[b] SE – standard error.

The results show that the 35 countries which chose the US-oriented donation are more likely to be American countries and have lower per capita GDP, smaller population and higher general government final consumption expenditure compared to the mix-oriented countries. The Haiti-oriented countries can be seen as making purely humanitarian, objective and none-political donations since Haiti is one of the poorest countries in the world. These countries are more likely to be non-Asian, which can be explained with the fact that most Asian countries are still developing economies lacking abilities and incentives to provide assistances to Haiti. The China-oriented countries have similar characteristics to the US-oriented cluster, except the North American country variable.

In this sense, donor countries with lower per capita GDP, smaller population and higher government expenditure have more incentive to implement an explicit donation-oriented policy which seems to bring some benefits to these countries from US or China. However, the American countries are more likely to show their

goodwill to US. National image is considered a country's soft power (Nye and Owen, 1996) and one of the major goals of diplomacy is to build, maintain and improve this image (Serajnik-Sraka, 1999). The US- and China-oriented countries believe that disaster-related diplomatic activities can benefit their national image, which is one of the purposes of providing assistance to these countries in the time of need.

The Devoid countries have lower HDI and locate in North America, which includes the Caribbean and Central America. These results are not unexpected since a less socially advanced country always has important social problems to handle which limit its government's ability to extend foreign aid.

4.3 Determinants of the disaster aid size

After the decision to provide humanitarian relief, the donor countries have to consider what the size of this assistance should be in order for it to help the process of recovery from the destructive events. From a purely humanitarian perspective, the amount of disaster aid should be related to the degree of damage. However, the response from the donor countries in the three disaster situations was distinctively different. As the richest and most advanced country in the world, US has more adequate resources to handle and recover from the disaster than was the case for China. However, more cash and supplies assistance were provided to US which signals that international donation has become a geopolitical campaign or a competitive exercise of image building. The global community donated very actively in response to the horror and devastation of the Haiti Earthquake. It appears that how much to donate is a selective and unstable process. We use an OLS regression to model the determinants of the amount of disaster aid. The estimated results are shown in Table 7. The statistical significances for the three cases are 0.000, which means that the regression models fit the data reasonably well.

Table 7 Determinants of the disaster aid size

Explanatory Variables	Hurricane Katrina		Haiti Earthquake		Wenchuan Earthquake	
	Coefficient [a]	SE [b]	Coefficient	SE	Coefficient	SE
(Constant)	-7.0361*	3.9827	-5.2236**	2.6654	-20.9817**	9.4144
Continent [c]	-1.0587*	0.6911	0.5682	0.6297	0.6267*	0.3913
lnGDP	8.7481	0.8577	0.0823	0.0725	-3.8678*	2.0592
lnPGDP	1.6193***	0.5678	1.2164***	0.3860	4.5152**	2.0075
lnGGFCE	-0.4155	0.4611	0.4294*	0.2545	-0.0930	0.1995
lnPopulation	0.7494	0.4949	0.1417	0.3014	4.0048**	2.0311
HDI	-7.1143**	2.9972	-9.6750***	2.9368	-2.2158	2.7062
lnExport	-0.1359	0.1434	0.0107	0.2106	0.2491***	0.0997
lnImport	0.3319	0.2216	0.8827**	0.4100	0.1108	0.1791
Number of observation	107		106		122	
R	0.6669		0.7773		0.6464	
R^2	0.4447		0.6042		0.4178	
Adjusted R^2	0.4055		0.5716		0.3766	
Sig.[d]	0.000		0.000		0.000	

[a] *,**, *** mean statistically significant at 10%, 5% and 1% level respectively.

[b] SE – standard error.

c We merged the variables of the American country and the Asian country into the variable of Continent since we try to detect the continent geographies of generosity.

[d] Sig. – significance.

The estimated results show that the per capita GDP of the donor country has a positive effect on the assistance amount in all three cases; namely, the donor countries with higher developmental level provided more assistance to the disaster-stricken country. This meets our expectations as developed countries are expected to have integrated humanitarian assistance mechanisms. Donor countries with greater per capita GDP have the ability to gain more internal revenue, which means they can allocate more aid budget to provide assistance to the disaster-stricken countries.

Geographic features, such as location, distances, terrain, climate and resources, impact on a government's foreign security policies (Kelly, 1997). The results show that the geographies of generosity give insight into the continent's foreign affairs related to disaster relief to other countries in the case of Hurricane Katrina and Wenchuan Earthquake. For Katrina, donor countries located on other continents (excluding North America) were interested to donate more to US, which can be explained with their desire to attract US attention by large donations and enhance their national image. For example, in the aftermath of Hurricane Katrina, the

Government of Kuwait made a US$500 million pledge for relief efforts. Compared to Hurricane Katrina, the Asian donor countries are more likely to donate more to China revealing another aspect of the geographies of generosity.

Export to China has a statistically positive effect on the assistance amount; donor countries with more export to China provided more assistance. This can be explained by the fact that these countries wanted to maintain good relationships with China because of business trading needs. For the Haiti Earthquake, we also found that import to Haiti has a statistically positive effect on the assistance amount. Although Haiti is one of the poorest countries in the world, some of the main donors including Canada, France and the Dominican Republic import to Haiti by trading for raw materials. However for Hurricane Katrina, we find no statistical evidence of an impact of trading relationships on the assistance amount.

The variable of general government final consumption expenditure has weak positive effect on the assistance amount for the Haiti Earthquake. This can be explained that the donation activities to Haiti Earthquake indicate a pure humanitarianism aid.

The HDI has a negative effect on the assistance amount for Hurricane Katrina and Haiti Earthquake, which is against our expectations. Higher HDI indicates that the donor country has a better social welfare; however, the donor countries with lower HDI had the incentive to donate to US and Haiti. In the case of US, this can be explained as an opportunity resulting from disaster diplomacy and strengthening of the national image, which might benefit further international affairs. The donors which donated more to Haiti have higher general government final consumption expenditure and per capita GDP, which means that countries with high economic development level and larger government sector have the incentive to donate more humanitarian relief.

Population size has a positive effect on the assistance amount in the case of the Wenchuan Earthquake. The Asian countries with larger populations, e.g. India and Japan, provided more relief to China which proves the geographies of generosity in Asia. Moreover, when a disaster-stricken country appeals for special supplies, such

as tents, medicine, sheets, generators, etc, these can be collected and delivered immediately from its neighbours. This was the case with the Wenchuan Earthquake.

5. Conclusions

According to Williams (2006), it is a condition of human existence and sanity to be selective in providing assistance to the needy as we cannot equally care about all human suffering in the world. The results from the three cases show some common characteristics in the behaviour of the donor countries. (1) Developmental level has been by far the most significant factor in providing aid. The donor countries with lower per capita GDP, smaller population and higher government expenditure have the incentive to implement an explicit donation-oriented policy which seems to bring some benefits to these countries from US or China. A possible explanation for this is that the countries with high developmental level have more responsibilities for global humanitarian assistance (e.g. Kapacu, 2011); so they were less generous in allocating assistance to US and China because they considered the two countries to have the ability to handle the disasters. (2) Geographies of generosity also give insight and direction to the continent's foreign affairs related to disaster donations to other countries in the cases of Hurricane Katrina and Wenchuan Earthquake. (3) Export to China has a statistically positive effect on the assistance amount for Wenchuan Earthquake. However for Hurricane Katrina, we find no statistical evidence of an impact of trading relationships on the assistance amount. (4) The variable of general government final consumption expenditure has weak positive effect on the assistance amount for the Haiti Earthquake. (5) However, the donor countries with lower HDI have the incentive to donate to US and Haiti.

Though the donor countries have different incentives, how to integrate global assistance is a key question in improve the efficiency of disaster relief. This study confirms the strong need to build a GIN as argued in previous research (Mak et al., 1999; Bui et al., 2000). As natural and other disasters (e.g. the Fukushima nuclear reactors meltdown in 2010 and the increasing number of climate change related calamities) are likely to continue in the future, such a network should be funded as

part of the international community's efforts to provide prompt responses and relief assistance. Donor and receiving countries as well as the international disaster coordinating organisations should be able to retrieve and fuse data into useful information for the needed cash and supplies assistance in terms of amounts, timing, location, transportation and delivery options.

Estimating the costs associated with the building of such a GIN requires further research; however it will be a very practical step in preparing for the best possible response to real world problems in situations where there are many pressing demands on the timing and information about the much needed assistance. The GIN can be linked to the Internet; parts of it can be publicly accessible in order for communities and organisations to provide and access information and other resources, such as logistics, survival tips and first aid advice, while other parts could be used by emergency agencies to coordinate their efforts. Such an information system will also assist for collaborative governance in disasters of international scale where there coordinating mechanisms are much needed (Kapacu, 2011).

In a highly globalised world faced with the challenges of increasing natural and human-made calamities, disaster relief becomes more the norm rather than the exception. Understanding what drives individual countries to provide humanitarian aid is very important and the analyses of the three major events of the 21st century provided some insight as to who is likely to respond to the call for help and why. Irrespective as to where from, how and in what size the disaster relief is provided, the analysis shows that there are still a lot of geopolitics and disaster diplomacy. Creating a global information network (GIN) will not only make the process more immediately transparent but will also facilitate the people on the ground whose direct task is save lives – the highest priority in any disaster situation, before researchers have the luxury to analyse the concepts of relief generosity.

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