

# Politicizing Preparation: Evidence from India on the Incentives for Disaster Preparedness

Jennifer Bussell



ROBERT STRAUSS CENTER  
FOR INTERNATIONAL SECURITY AND LAW



COMPLEX EMERGENCIES  
AND POLITICAL STABILITY  
IN ASIA

# **Politicizing Preparation: Evidence from India on the Incentives for Disaster Preparedness**

*By Jennifer Bussell, University of California, Berkeley*

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## **Abstract**

Existing theoretical accounts suggest that governments have little incentive to invest in disaster preparedness, yet many states do exhibit significant efforts to reduce their risks from natural hazards. While some work posits that past exposure and economic conditions are potential explanations for this empirical puzzle, these perspectives largely ignore the political dynamics of policy making. I argue that understanding the political economy of preparedness policies, and in particular the ways in which natural hazard risks intersect with electoral competition, bureaucratic capacity, and expectations about external assistance in the case of a disaster (moral hazard), are key to comprehending the puzzle of disaster preparedness. Using new and unique data on disaster preparedness training from India's states, I show that it is not simply exposure to past hazards that predicts preparedness policies, but rather the character of that experience—in particular the number of individuals affected by an event—and the incentives of the government to deliver public goods, that are most important to understanding policy outcomes. In addition, politicians' expectations about the likelihood of external support in the case of a hazard event, which could offset the government's need to engage in response, are also likely to affect their incentives to prepare. These findings suggest, in general, that it is a government's expectations about the likely electoral implications of preparedness initiatives—or the lack thereof—that are most closely tied to the probability of implementing such initiatives.

## **Introduction**

Research on the relationship between natural disasters and politics presents us with a puzzle. Citizens reward effective political responses to natural disasters and punish failures to respond (Healy and Malhotra 2009, Bechtel and Hainmueller 2011; Cole, Healy, and Werker 2011). In addition, voters fail to reward disaster preparedness, and may even punish incumbents for investing in preparedness over other public benefits, despite the generally greater efficiency of spending on preparedness versus response (Healy and Malhotra 2009). The theoretical explanations for these empirical patterns rest on the assumption that it is more difficult to observe investments in preparedness, and thus reward them at the ballot box, than investments in response.<sup>1</sup> In addition, the likelihood of moral hazard related to natural disasters, given the propensity of higher level domestic or international actors to respond in times of disasters, further disincentivizes governments to allocate scarce resources toward preparedness activities (Cohen and Werker 2008). Thus, political elites should have few incentives to invest in preparedness. Yet, the empirical evidence suggests that in many cases governments *do* take precautions in advance of natural hazards. This is easiest to observe in cases where hazards in recent years have led to significantly fewer deaths and damages than resulted from previous similar events, such as has been the case with recent cyclones in India and Mozambique (UNEP 2013, Bussell and Malcomb 2014). What explains this disconnect between our existing understanding of the (dis)incentives for preparedness and the realities on the ground?

Existing work stresses the importance of past exposures to natural hazards and the economic capacity of the government to invest in preparedness activities. Yet, recent evidence suggests that the combination of perceived risk due to previous experiences and economic

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<sup>1</sup> For a related logic concerning responses to economic performance, see Healy and Lenz 2013.

conditions are insufficient for explaining a substantial portion of preparedness outcomes. Case studies of national-level preparedness in countries across Africa indicate, for example, “that past exposure and income explain little about preparedness when there is limited electoral incentive to invest in disaster management or minimal bureaucratic capacity to implement preparedness programs.”<sup>2</sup> Similarly, theoretical accounts highlight the potential relevance of moral hazard, such that even risk-prone and economically stable states will be less likely to invest in preparedness when leaders anticipate assistance from external actors in the face of a natural disaster (Cohen and Werker 2008).

In this paper, I investigate these empirical and theoretical discrepancies to shed greater light on the reasons governments invest in preparedness, and the policy implications thereof. I argue that a more comprehensive analysis of the political incentives to invest in disaster preparedness is required to establish a rigorous understanding of why some countries and sub-national units are more likely to prepare than others. In particular, understanding the political incentives to spend on preparation for natural hazards—versus the multitude of other activities on which a government can spend—necessitates attention to the potential political benefits of preparedness—in general as well as relative to response—and the ability of states to implement preparedness initiatives successfully.

I test these arguments using unique data on investments in preparedness at the sub-national level in India. Historically, it has been difficult to evaluate claims related to disaster preparedness, as most measures of natural hazard intensity—lives lost, individuals affected—are

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<sup>2</sup> Bussell 2013.

endogenous to preparedness.<sup>3</sup> Here, I instead use a new measure of preparedness—the number of individuals trained in a government disaster preparedness program—to provide an estimate of the degree to which governments are willing to allocate personnel resources to the end goal of disaster preparedness.

I find that economically stronger states are more likely to invest—as predicted—but this relationship is not as strong as we might expect. Similarly, the perceived risk of natural hazards—based on past exposure—is an important predictor of preparedness efforts, but this is not universally true across all measures of exposure. Specifically, the total number of individuals affected by recent disasters, per capita, is closely linked to preparedness, but deaths per capita and economic damages are not. This suggests that it is not merely past exposure, but rather perceptions of the widespread nature of exposure to still living individuals, that is most important to preparedness investments.

In addition, I find clear evidence for the importance of political conditions in shaping the incentives to invest in preparedness. In line with existing work on public goods provision, political units with higher levels of electoral competition—as measured by the number of parties holding seats in the legislature—are less likely to dedicate resources towards preparedness. Somewhat weaker results suggest that states with lower levels of political development—operationalized as the level of petty corruption—are also less likely to train their staff in how to deal with natural hazards. Finally, there is mixed evidence on the risks of moral hazard related to the presence of external aid. Within India, conditions associated with the receipt of aid from the central government are not correlated with investments in training. However, the presence of

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<sup>3</sup> For example, the EM-DAT dataset, which I use here to measure past exposure, cannot distinguish between actual lives lost and lives that would have been lost in the absence of any past preparedness endeavors.

internationally-funded development projects is correlated with a reduced likelihood to engage in preparedness activities. This implies a risk for moral hazard associated with international aid.

This paper contributes to a rich literature on the incentives for public goods provision, as well as more specific research on natural hazards. Existing work suggests that for “every day” forms of public goods—such as development spending—governments with robust, two-party competition will be more likely to provide these goods than those characterized by a multi-party system (Chhibber and Nooruddin 2004). I extend this logic to the provision of public goods related to less predictable events, natural hazards. My findings related to the capacity of governments to implement preparedness programs also complement a growing literature on the role of the state in providing public benefits, given its own capabilities and relative to other societal actors (Cammet and Maclean 2014, Brass 2016, Gulzar and Pasquale 2017). Finally, and importantly from the perspective of international aid, the evidence presented here also suggests that the threat of moral hazard may not only be relevant to disaster preparedness initiatives, but that simply the presence of an externally funded initiative—even one with no direct relevance to natural hazards—may reduce the incentives for domestic actors to invest in their own preparedness initiatives.

In the next section, I review in brief existing theories of the logic for disaster preparedness and the empirical evidence to date to support or refute these claims. I then describe how a theory of political incentives better accounts for the diversity of observed outcomes in preparedness. Subsequently, I discuss the empirical strategy and present my results. I conclude with a discussion of the policy implications emerging from these findings.

## **Political Incentives and Preparedness**

Recent analyses suggest a number of important dynamics related to the relationship between rare events and political behavior. First, the literature on retrospective voting posits that voters punish politicians for shocks that are largely out of their control, such as shark attacks and losses by local sports teams (Healy et al. 2010; Achen and Bartels 2013). If this is the case, then we might expect even stronger punishment of elected officials for shocks, or effects of shocks, that are at least somewhat within their control. Indeed, voters have been shown to punish politicians for weather shocks in general, but to reward incumbent politicians for successful disaster response efforts (Cole et al. 2011, Healy and Malhotra 2010). At the same time, voters do not seem to value disaster preparedness efforts (Healy and Malhotra 2010). While this suggests that democratically elected governments should be more willing to engage in disaster response versus preparedness, the relative cost effectiveness of disaster preparedness over response implies that such an investment strategy is a highly inefficient policy outcome (Ibid.).

Given these dynamics, it is relevant to consider what set of factors might encourage political actors to make an investment that is perceived to have such limited political value. Existing work suggests that the two most relevant dynamics may be the perceived risk of a future natural disaster and the financial capacity of the state to make preparedness investments. One plausible explanation is that those places with a history of greater exposure to natural hazards will be more likely to invest in preparedness (Keefer et al. 2011, Hsiang and Narita 2012). While the causal mechanism linking exposure to greater preparedness is debated—the expectation of future economic costs, the potential for conflict, and potential electoral responses in the wake of

a future hazard have all been offered as potential explanations—the consistent expectation across existing accounts is an empirical correlation between past hazards and preparation.<sup>4</sup>

Alternatively, preparedness is also thought to be linked to the economic feasibility of efforts to respond to natural hazards.<sup>5</sup> While the proposed mechanism underlying the link between economic conditions and preparedness efforts differs across existing accounts: governments may view natural hazards as a threat to their economic performance, a potential cause of conflict, or a possible driver of future electoral behavior.<sup>6</sup> But regardless of the theoretical logic, analysts expect richer states to be more likely to invest in preparedness efforts, all else equal.

What is missing from each of these arguments, in their current states, is a direct account of the explicitly political nature of policy making. The risk of a natural hazard is not necessarily a political risk if officials expect that they can respond in ways that produce positive electoral outcomes. Indeed, natural disasters might conceivably offer opportunities for elected officials to demonstrate their value to voters, if they have the capacity to rapidly respond in a time of crisis. Thus, for perceived risk to exhibit a relationship with preparedness for such hazards, we must consider both the kind of anticipated risk—to whom, to how many, in what ways—and the relationship between this risk and other characteristics of the government, such as readily available economic and infrastructural resources and the overall bureaucratic capacity to respond in a crisis, to which I will return momentarily.

Regarding the first point, the kind of anticipated risk, governments may be more sensitive to certain anticipated outcomes than others. For example, if in the wake of a previous hazard

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<sup>4</sup> World Bank 2009, Healy and Malhotra 2009, Bechtel and Hainmueller 2011, Keefer et al. 2011, Hsiang and Narita 2012, Hsiang et al. 2013, Hsiang and Jina 2014.

<sup>5</sup> Cohen and Werker 2008, Keefer 2009; Keefer, Neumayer, and Plumper 2011.

<sup>6</sup> World Bank 2009, Hsiang and Jina 2014, Hsiang et al. 2013.

event—such as a flood or drought—an intermediate number of people died and only a small portion of additional individuals were affected by the hazard, officials may have a different reaction post-hoc than in a case where a relatively small number of people died, but a large number of people were affected, e.g. lost their homes, were injured, etc. In the latter case, even though fewer people died, a much larger portion of the population may change their electoral behavior on the basis of their experience with the hazard and the government’s reaction to it. If in this case, because so many people were affected, we can assume that there was only a mediocre response by the government, the likely electoral response of these individuals will be negative toward the incumbent administration. In contrast, in the former case, even though the effect of the hazard was substantially worse for the majority of those affected—they were killed—the overall political implications of the event may be less dramatic. There are fewer people affected, overall, who can vote in future elections, thereby potentially reducing the negative electoral impact of the event for the incumbent government. Alternatively, as Cohen and Werker have suggested, governments may be more likely to invest in preparedness efforts “in regions that are politically aligned with the party in power”.<sup>7</sup> While these are only a few examples, they do suggest that variations in the nature of the hazard event—particularly in terms of who is affected and in what ways—may be relevant for understanding the incentives of governments to invest in preparedness.

Also potentially important, and to the second point raised above, is the way in which past hazards—and their implications for future perceived risks—intersect with other economic and political characteristics. As previously noted, economic conditions are expected to play an important role in shaping preparedness efforts, but why is this the case? In general, richer

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<sup>7</sup> Cohen and Werker 2008: 797.

governments should have more available resources to engage in response, suggesting that they might *not* be interested in preparedness, because they should be able to offer a viable—and electorally beneficial—response at the time of a hazard. At the same time, if there is the expectation that a large number of individuals are likely to be affected by future hazards, and thus require payouts at that time, even rich governments may see the relative economic benefits of engaging in preparedness efforts that are more economically efficient, so as to reduce the overall financial burden—and risk of a failed response—at the time of a hazard event.

Perhaps even more relevant to consider alongside perceived risk is the actual capacity of the government to engage in a preparedness program. Where there is insufficient development of the bureaucracy to allow for a concerted implementation of preparedness activities—such as training of officials, distribution of resources to high-risk areas, and educational programs for children and local community leaders—the weight of past events may be very minimal. If the administration is, for example, corrupt, or highly politicized, then preparedness initiatives are unlikely to be implemented in an efficient and cost-effective manner. As a result, governments may be less likely even to introduce preparedness initiatives, regardless of expectations about future hazards. Thus, the effects of perceived risk may be strongly conditioned by the character of development within the bureaucracy.

Beyond perceived risk—and its interactions with economic and bureaucratic conditions—there are a number of other dynamics that may affect the political incentives of governments to invest in preparedness. I consider first electoral dynamics, before moving to issues of state-society relationships. Existing research suggests that the character of the electoral environment may be quite important to understanding the allocation of state resources to what may generally be thought of as public goods—such as overall disaster preparedness initiatives—

versus private or club goods. As Chhibber and Nooruddin show in the case of India, state governments are more likely to support extensions of public goods when there are relatively smaller numbers of parties in government, as these goods are likely to benefit the broad voter bases supporting these parties. (Chhibber and Nooruddin 2004). In contrast, where there are many parties in power governments are more inclined to promote club goods that can be used to target the smaller support bases of each individual ruling party. Thus, we might expect to see more disaster preparedness efforts in those political units where there are relatively fewer parties holding seats in the government at a given moment in time.

The timing of a preparedness policy initiative may also matter in electoral terms. Frequently, governments are expected to behave differently in the lead up to an election. In order to garner all possible available votes, ruling politicians may, for example, spend in a differential manner or announce new projects. If there is the expectation that a preparedness initiative could garner substantial additional votes, then we might expect to see more of such programs announced or implemented just prior to an election. If, in contrast, and as the existing literature suggests, preparedness efforts are often difficult to observe, then we might instead expect to see either a null relationship between election timing and preparedness efforts or even a negative relationship, the latter suggesting that available resources are being allocated to other, more visible activities during this period. More generally, the dynamics of electoral politics should reasonably be linked to the incentives of politicians to allocate resources in a particular manner, with direct implications for the nature of disaster preparedness.

The relationship between government actors and organizations outside the state may also be relevant to preparedness policies. The most explicit existing hypothesis in this regard concerns moral hazard. Specifically, the incentives of governments to invest in preparedness may

be directly related to their expectations about the likelihood of external intervention and support in the wake of a natural disaster. Where governments anticipate that they will receive substantial financial and in-kind assistance at the time of a major natural disaster, most often from international and bi-lateral aid agencies, they may be less likely to invest their own resources in preparing for such disasters.<sup>8</sup> This should especially be the case in states where there are significant constraints on the spending capacity of the government, implying the need to reduce costs wherever possible to enable spending in other areas. In contrast, where governments do not expect such support, they may be relatively more likely to engage in their own preparedness efforts, an effect resulting in what Cohen and Werker refer to as “pariah” states.<sup>9</sup> While other work has shown that active efforts by international organizations can use aid conditionalities to ensure parallel government investments in preparedness, the overall relevance of moral hazard to such policies remains largely untested.<sup>10</sup>

A related dynamic concerns the presence of local civil society organizations that may take an interest in natural hazard related issues. As has been shown in the work on non-governmental organizations, these actors often play a role in the provision of social services generally, as well as with regard to natural hazards, particularly in developing countries.<sup>11</sup> Thus, we might expect to see the presences of civil society actors associated with government preparedness efforts in at least two, potentially contrasting, ways. First, such organizations might place pressure on government actors to invest in preparedness, thereby increasing the likelihood that we should observe such policies in contexts where non-governmental organizations are

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<sup>8</sup> Cohen and Werker 2008.

<sup>9</sup> Cohen and Werker 2008: 811.

<sup>10</sup> Bussell 2013, Bussell and Colligan 2014

<sup>11</sup> Allen 2006, MacLean 2011, Cammet and MacLean 2014; Bussell and Malcomb 2014; Brass 2012, 2016.

highly saturated. Alternatively, we might instead observe a form of domestic moral hazard, akin to that anticipated from the presence of international organizations. Here, government actors may anticipate that a substantial presence of NGOs implies alternative actors who will themselves invest in preparedness efforts, leaving the government to focus on other issues. Empirically, we often observe something different, such as the substantial, government-driven coordination of natural disaster-related NGOs in Mozambique.<sup>12</sup> Nonetheless, there is the potential that, in general, governments in contexts with substantial NGO penetration may rely on such actors for preparedness, rather than invest in their own policies.

Overall, these arguments suggest that, when considering potential investments in disaster preparedness, government actors may be taking into account a substantially wider set of dynamics than is implied by accounts emphasizing only past exposure or economic capacity. Instead, there is reason to believe that elected officials also consider their electoral position, the capacity of their government to implement a proposed program, and the likelihood that other actors might instead step forward to engage in related efforts, all of which can be related to the government's perception of the political benefits to investing in preparedness versus allocating resources in a different manner. Determining whether or not this is the case requires further analysis of empirical outcomes, to which I now turn.

### **Empirical Context and Research Design**

Investigating the nature of disaster preparedness programs is often difficult: these initiatives are frequently tricky to observe and most measures of “preparedness” are actually measures of disaster outcomes, such as total killed individuals, which are endogenous to preparedness. In

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<sup>12</sup> Bussell and Malcomb 2014.

addition, comparative examinations of preparedness can suffer from the difficulties of cross-national analyses, in which there are so many potentially relevant variables that differ across cases that focusing in on a few key theoretically informed characteristics can be constrained by the presence of many potential confounding variables.

In order to attempt to alleviate these difficulties, I focus here on a single country case—India—in which there is substantial sub-national variation. This allows me to control for many institutional variables across sub-national units, while still allowing for variation in the environmental, economic, political, and social dynamics highlighted in the empirical discussion.

I also take advantage of a new and unique measure of disaster preparedness, the number of sub-national government officials trained as a part of an ongoing central government program in disaster preparedness. In this program, state governments in India submit to the central training body—the National Institute for Disaster Management—their requests for disaster preparedness training, which are then incorporated into the annual training schedule.<sup>13</sup> Representatives from the states are then sent to the training programs when they occur. Thus, the central government makes this training program available to the states, but it is incumbent upon the state governments to express their training needs and to put forward the individuals for training, who would otherwise be engaged in their regular day-to-day assignments. Participating in this preparedness program consequently represents an investment by state governments in the preparedness of their administration and state.

I collected data from the central training department's website on the individuals trained each year for the fiscal year 2009-10 to 2014-15 (six years), across all of India's 28 states and the

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<sup>13</sup> Interview with central government official, New Delhi, March 26, 2014.

union territories of Delhi and Puducherry.<sup>14</sup> I then generated a per capita measure based on the annual population estimates for each state in the Indian union. This measure reflects the relative importance that each state government places on training its bureaucrats in disaster preparedness, in particular, and their overall investments in preparedness, in general.

The availability of this unique and non-endogenous measure of sub-national disaster preparedness efforts makes India a particularly appealing context for evaluation. Yet, even without this measure, India is a compelling case for a comparative study of preparedness. The country is faced with the full range of natural hazards, including floods, cyclones, drought, and earthquakes. The risk of these hazards, however, differs quite dramatically across the country with, for example, the eastern coast being the most prone to cyclones while the northwest is more likely to face drought and earthquakes. In addition, there is substantial variation across the country in levels on the independent variables identified by the theoretical discussion, suggesting a prime opportunity to evaluate the relationship between variation in these characteristics and the presence of preparedness efforts. Perhaps most importantly, as suggested by the character of the dependent variable, state governments in India have substantial autonomy over policy-making, allowing for a truly comparative study of the incentives to make public investments in preparedness.

General data availability at the sub-national level is also quite good in India. Government statistics on population and economic conditions, in addition to the presence of civil society organizations, are freely accessible, as are independent measures of bureaucratic capacity. International organizations, such as the World Bank, via AidData, and the Centre for Research on the Epidemiology of Natural Disasters (CRED), also make available data on the provision of

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<sup>14</sup> <http://nidm.gov.in/default.asp>, India's 29th state—Telengana—is included in these analyses as a part of its former state, Andhra Pradesh.

financial assistance to sub-national units and the human and financial costs of past natural hazards, respectively.

I use these data to operationalize the theoretical concepts discussed above, thereby generating at least one measure for each of the independent variables under consideration. To measure past exposure to natural hazards—and, by implication, perceived risk of future events—I draw on three measures from CRED’s Emergency Events Database (EM-DAT): annual totals of total individuals killed due to natural hazards, total economic damages per year, and total individuals affected by natural disasters. For the first and third measures, I generate per capita measures using estimates from the Indian census, interpolated based on the estimates from the 2001 and 2011 censuses. This set of measures allows me to evaluate the implications of differing types of effects, in terms of killed versus affected individuals and relative economic costs.

To measure economic conditions, I use reports from India’s Ministry of Statistics and Programme Implementation on annual state domestic product per capita. Similarly, I draw on information provided by the National Institution for Transforming India (NITI-Aayog), via the NGO-DARPAN platform, to generate an annual measure of the total registered NGOs in each state.<sup>15</sup>

Estimates of electoral conditions come from official reports of the Election Commission of India on the results of state assembly elections. In order to measure electoral competition, I calculate the effective number of parties holding seats in the state assembly (ENPS), using the standard formula based on a Herfindal-Hirschman index. I generate a 0/1 measure of whether or not there was an election to the state assembly in the year under consideration based on the official schedule of elections across the states.

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<sup>15</sup> <http://ngodarpan.gov.in/index.php/home/statewise>

For variables not covered by official government statistics, I draw on data from alternative sources. I operationalize government capacity using a measure of petty corruption at the state level, or citizens' experience with demands for bribes across a range of government departments. While this does not capture all aspects of capacity, such as the varying tendency of state governments to transfer bureaucrats, it does quantify a key element of bureaucratic culture, which is the tendency to participate in, or accept, illicit transactions related to government activities. This measure is relevant to the topic of disaster preparedness because it is plausibly related to the likelihood that bureaucrats would skim funds from preparedness initiatives, or request bribes in the process of implementation, thus limiting the overall efficiency of such an initiative. This particular measure is based on surveys of individual citizens conducted by Transparency International India and the Centre for Media Studies in 2005, prior to the period of disaster training evaluated here. As such, I cannot evaluate variations in petty corruption on an annual basis, but this measure does provide a baseline for estimating variations in bureaucratic corruption across India's states.

To gauge the importance of moral hazard in decisions about disaster preparedness, I use measures estimating the potential for both international and domestic aid. For international support, I use data from the World Bank on the presence and size of projects within each of India's states.<sup>16</sup> This allows me to estimate not only the presence of an international actor, but also the relative size of that actor's investment in a particular location, on an annual basis. To assess the potential for domestic support in the time of a natural hazard, I use a measure of the electoral alignment between the state government and the central government. As previous work has shown, political alignment between the Centre and the states is a strong predictor of whether

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<sup>16</sup> While it is relatively unusual for the World Bank to make agreements with sub-national governments, it does so on a regular basis in the case of India.

states receive discretionary funding from the central government.<sup>17</sup> Thus, I expect alignment between the central government and a given state government to be a good predictor of whether said state will expect to receive substantial assistance from the Centre at the time of a natural hazard.

## **Analysis and Results**

Using the measures discussed in the previous section, I evaluate the relationship between each proposed independent variable and the number of individuals trained in disaster preparedness, per capita. I first evaluate these relationships using bivariate regressions and then conduct a set of multivariate analyses using those measures that display strong relationships with the measure of the dependent variable. For those variables that should theoretically require the passage of some time prior to affecting policy outcomes, such as experiences with natural hazards, I lag these variables by one year. For all of the analyses presented here, the dependent variable has been scaled so as to make the coefficients more easily presentable. In terms of interpretation, a one-unit increase in each independent variable would be associated with a change in the DV of one hundred thousandth of a person trained, per capita. An alternative version of the results, in which the interpretation of the relationship between variables is a one person change, per capita, in the number of people trained, is shown in the Appendix.

The bivariate analyses suggest quite differential relationships between the set of proposed independent variables and the number of individuals trained. As shown in Table 1, while certain measures, such as total people affected per capita, display quite strong relationships with the level of disaster training, this is not the case for other measures, including whether the state

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<sup>17</sup> Arulampalam et al. 2009.

government was politically aligned with the Centre. In particular, we see strong relationships between the number of trained individuals and measures of perceived risk, economic conditions, electoral conditions, and moral hazard, with a weaker relationship for bureaucratic capacity. At the same time, where there are multiple measures for a single category, these measures do not hold for all of the given measures.

In terms of perceived risk, there is quite substantial variation in the relationship between the measures of the independent variable and people trained, as hypothesized in the theoretical discussion. We observe no clear association between the number of people killed or the total economic damages and the number of people trained. In contrast, an increase in the proportion of the population affected (affected per capita) is positively and strongly associated with the number of people trained. This suggests that politicians may be more responsive to widespread past events, even if they are not deadly, than to relative differences in the number of people killed or the economic costs of previous events. More generally, this finding helps to make more specific the potential implications of past events for investments in preparedness. We cannot simply assume that a country will prepare for future events if it has experienced natural hazards in the past; the nature of the events themselves are relevant to future policy.

The finding for economic conditions is as expected based on past theory and analysis. Richer states are more likely to allocate bureaucrats to disaster preparedness training programs. This suggests that these states may also be spending more on other disaster preparedness efforts, to which these trained individuals may be allocated upon completion of their training.

Perhaps even more interesting are the findings for the remaining variables, which have received less attention to date in the empirical literature on the political economy of natural disasters. We observe differing results for the two measures of electoral conditions. In the case of

election timing, there is no clear relationship between this and training of personnel. Given that these training initiatives may receive very little public attention when they happen, this is perhaps not too surprising. With regard to electoral competition, as measured by the number of parties holding seats in the legislature, we see something quite different. As anticipated by existing work on public and club goods, there is a negative relationship between the number of parties in the legislature and the per capita number of individuals trained. For each additional party holding seats in the legislature, we see a reduction of .06 hundred thousandths of a person trained per capita. While this may not seem like a major substantive change, this finding does imply a strong relationship between legislative dynamics and the willingness of politicians to invest in policies that are likely to benefit the population at large, rather than only a subset of voters.

There is a weaker relationship, but in the predicted direction, between the measure of petty corruption—intended to capture the capacity of the bureaucracy to implement policies—and the level of training. As expected, higher levels of corruption are associated with lower levels of corruption. In this case, because the corruption measure is scaled zero to one, moving from the least corrupt state to the most corrupt state is associated with a decrease of .06 hundred thousandths of a person trained per capita.

The findings for moral hazard are less straightforward. A simple measure of whether there was an active World Bank project in the state during the year in question exhibits a strong relationship with people trained, and in the predicted direction. States with World Bank projects were, in general, less likely to train their personnel. This contrasts with the finding for the size of World Bank disbursements, for which there is no evidence that having higher spending by the Bank, per capita, is associated in any significant way with the character of disaster preparedness

training. Finally, we also observe no clear association between the political alignment of states with the central government, and the intensity of training. This is an indication that expectations about domestic support in the case of a natural disaster are less relevant to state governments than their expectations about international support. This is particularly interesting in the case of India, where the national government has previously focused on domestic support, in lieu of international aid, at the time of major disasters.<sup>18</sup> Yet, the finding for presence of a World Bank project does offer an indication that there may be some element of moral hazard influencing disaster preparedness policymaking.

Finally, We observe no clear association between the penetration of civil society organizations and the willingness of states to allocate resources to disaster training. While the relationship is in the direction predicted by accounts emphasizing a positive association between the presence of civil society organizations and preparedness, it is not statistically significant. Future analyses could potentially investigate whether this lack of clear association may be related to the opposing forces of public pressure—civil society organizations may attempt to compel government actors to invest in preparedness—versus moral hazard—the same organizations may also be expected to fill in where government efforts are limited.

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<sup>18</sup> Kasturi 2013.

**Table 1 – Mixed Results for Proposed Independent Variables in Bivariate Analyses**

Overall Measure	Independent Variable	Coefficient (Standard Error)	Constant	N
<b>Perceived Risk</b>	Total Killed (per cap)	16.83 (94.24)	.13	231
	Total Affected (per cap)	.14*** (.04)	.09	224
	Total Damages ('00000)	-.001 (.001)	.14	231
<b>Economic Conditions</b>	State Domestic Product (per cap, '00000)	.11* (.05)	.02	217
<b>Electoral Conditions</b>	Election Year	-.02 (.05)	.09	210
	Effective Number of Parties (Seats)	-.06*** (.02)	.27	210
<b>Bureaucratic Capacity</b>	Petty Corruption Level	-.06 <sup>+</sup> (.04)	.07	140
<b>Moral Hazard</b>	World Bank Project	-.18** (.06)	.22	100
	World Bank Disbursement (per cap)	46.84 (47.59)	.12	100
	Centre-State Political Alignment	-.05 (.04)	.11	203
<b>Civil Society</b>	Registered NGOs (per cap)	1617.74 (1471.99)	.09	231

Table reports OLS regression coefficients for bivariate analyses, with standard errors in parentheses. For all analyses, + =  $p < .10$ , \* =  $p < .05$ , \*\* =  $p < .01$ , \*\*\* =  $p < .001$ .

Building on these analyses, I now examine a set of multivariate models, incorporating those measures that displayed statistically significant relationships with preparedness training in the bivariate models. This second set of analyses attempts to account for possible associations between the independent variables, which could be resulting in confounding in the bivariate

analyses. In particular, we might expect economic conditions to be associated with the effects of past hazards, bureaucratic capacity, and the presence of World Bank projects. However, limitations in coverage across states and years for multiple of the independent variables make it difficult to test full multivariate models. All of the models include the measures for past exposure (total persons affected per capita), economic conditions, and electoral competition. Variations in the model specification are related to the inclusion or exclusion of the measures for bureaucratic capacity (petty corruption) and moral hazard, due to the reduction in the number of cases implied by the inclusion of these variables. This noted, variations on the model specification still offer important insights into the relevance of multiple potential factors to the incentives for disaster preparedness.

The results of four multivariate models are shown in Table 2. These models suggest that the strongest and most consistent relationship is between the number of people affected by recent natural hazards and the number of people trained. This finding is in the predicted direction in all models and is statistically significant in three out of four specifications. Also strong are the associations between people trained and both economic conditions and electoral competition. Each of these measures displays a statistically significant relationship with training levels in the expected direction in two of the four models. Similarly, the measure of moral hazard (presence of a World Bank project) exhibits a statistically significant relationship with preparedness training in one out of the two models in which it is included. The only case where we see no evidence of a strong relationship is for the level of bureaucratic capacity (petty corruption). The coefficient for this measure is in the predicted direction in each of the two models in which it is included, but is not statistically significant.

**Table 2 – Perceived Risk, Economic Conditions, and Electoral Conditions are Strongest Predictors of Training Levels in Multi-variate Models**

Overall Measure	Independent Variable	Model 1	Model 2	Model 3	Model 4
<b>Perceived Risk</b>	Total Affected (per cap)	.06*** (.01)	.02 (.03)	.06** (.02)	.13*** (.03)
<b>Economic Conditions</b>	State Domestic Product (per cap, '00000)	.10** (.01)	.09 (.07)	.04* (.02)	.07+ (.04)
<b>Electoral Conditions</b>	Effective Number of Parties (Seats)	-.01 (.01)	-.06** (.02)	0.01 (.01)	-.06** (.02)
<b>Bureaucratic Capacity</b>	Petty Corruption Level	-.01 (.05)		-.03 (.04)	
<b>Moral Hazard</b>	World Bank Project	-.01 (.02)	-.13** (.05)		
<b>Constant</b>		.03	.31	.05	.17
<i>N</i>		61	91	140	210
<b>R<sup>2</sup></b>		.38	.22	.15	.17

Table reports OLS regression coefficients for multivariate analyses, with standard errors in parentheses.

## Discussion and Conclusion

Disaster preparedness is often given substantially less attention than response, both by analysts and policy makers. Yet, despite most expectations, some governments do invest in preparedness policies and the analyses that exist suggest these investments are both effective and more cost-efficient than a focus on disaster preparedness.<sup>19</sup> Given that this is the case, understanding the policy failure that is disaster preparedness, and the cases under which this failure does not occur, should be a prime focus of those interested in reducing the overall costs, both human and economic, that natural hazards imply for countries around the world.

<sup>19</sup> Healy and Malhotra 2009.

In this paper, I have used new data on disaster preparedness initiatives at the sub-national level in India to provide additional insights into the correlates of preparedness investments. Evidence from the training of bureaucrats in techniques of disaster planning and response offers a new lens into the ways in which state governments allocate resources to deal with natural hazards, even when there is no immediate threat. This data is particularly useful because it is not characterized by the same limitations of endogeneity associated with most existing measures of preparedness.

The findings presented here offer important support for, and evidence against, some of the most predominant theories related to the incentives for implementing disaster preparedness policies. While past exposure—as a measure of perceived risk—is an important predictor of training levels, this is only with regard to the number of people affected by hazards in the past, not the number killed or the economic effects of said hazards. Economic conditions are similarly significant, but not to the exclusion of other factors. Evidence in support of the importance of electoral conditions—particularly nature of party dynamics in the legislature—and the role of non-disaster-related investments by international actors—in the form of World Bank projects—also highlights the relevance of political incentives to disaster-specific policy outcomes. Politicians are less likely to make investments in preparedness if they think they can viably spend money on other kinds of programs and still retain office.

Perhaps the most compelling findings are for the combined effects of perceived risk and electoral competition, given that these measures display strong relationships in Model 4, the model with the largest number of cases, suggesting their relevance across the widest range of states and years. This implies that political actors are responsive to expectations about the magnitude of the population that is likely to be affected by future hazard events, but that they are

at the same time responsive to the particular nature of the constituencies that elected them.

Where states have experienced hazards affecting large number of people and where there are a small number of parties in power in a state, we should expect to see the most substantial investments in disaster preparedness.

One possible example of such a case is Odisha, an Indian state that has experienced the severe nature of cyclones on a regular basis over the last fifteen years. Recent events suggest that the state has invested substantially in preparedness efforts. In 1999, cyclone Paradip (Cyclone 05B) resulted in the deaths of at least 10,000 people, with substantially more affected in terms of homes and property lost.<sup>20</sup> In contrast, Cycloen Phailin, a similar intensity event that occurred in 2013, resulted in only 44 deaths.<sup>21</sup> Interviews with individuals associated with the most recent cyclone suggest that these differences were largely due to the preparedness programs that had ben initiated in the intervening years, including training of bureaucrats, local infrastructure initiatives, and early dissemination of evacuation plans.<sup>22</sup>

From a policy perspective, the findings presented here suggest a number of potentially relevant implications. The results of the multivariate analyses, in particular, imply that actors with an interest in promoting disaster preparedness should be cautious about making a number of assumptions. First, non-government actors should not assume poor countries or sub-national units will not find ways to invest in preparedness, if other factors are aligned in a particular manner. Even holding constant economic conditions, perceived risk and electoral conditions display strong relationships with levels of disaster training. This suggests that all politicians may perceive there to be a sufficient political logic to preparedness when risks are high and they are

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<sup>20</sup> Francis et al. 2001, EM-DAT.

<sup>21</sup> The Hindu 2013, Samenow 2013

<sup>22</sup> Interviews with state officials, Bhubaneswar, India, March 28, 2014.

likely to benefit electorally from public goods expansion, even if the economic costs of doing so may be relatively high.

Second, there is at least preliminary evidence to suggest that aid agencies should be cautious of preparedness investments in locations with low levels of bureaucratic capacity, particularly with regard to the presence of corruption. If sub-national governments are seemingly less willing to invest when there are risks of leakage in the processes of implementation, then external actors should perhaps have the same concerns. This does not mean that preparedness initiatives are infeasible, but rather that they should be introduced in ways that take these limitations into account, such as with the inclusion of anti-corruption provisions or the participation of non-government actors in implementation.

Finally, the dynamics of moral hazard are important, but not a given. International aid may be more relevant than domestic aid, at least in the Indian case, but the nature of the aid itself may be only tangential to political incentives. Aid agencies should expect that their presence in a location may be sufficient to induce the dynamics of moral hazard, even if the investment is relatively small. As a result, funders may want to incorporate conditionalities related to preparedness efforts into all investment—even those with no direct relationship to natural hazards—in order to reduce the risks that external actors themselves will be forced to bear substantial response costs at the time of a hazard, particularly in those countries and sub-national units prone to natural hazards.

Overall, the analyses offered here offer a cautiously optimistic view of disaster preparedness policies. Most importantly, some governments *do* invest in preparedness. This is not only because they may anticipate significant future risks to the voting public, but also that they see these investments as a form of public good. Where there is an electoral incentive to

invest in such goods, we are more likely to see these types of efforts. Relatedly, though moral hazard may well be a risk, this particular type of risk can be acknowledged and contended with, thereby increasing the overall likelihood of successful preparedness efforts, be they initiated by domestic or international actors, and the overall reduction of natural hazard risks to the public at large.

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## Appendix

**Table A1 – Mixed Results for Proposed Independent Variables in Bivariate Analyses**

Overall Measure	Independent Variable	Coefficient (Standard Error)	Constant	<i>N</i>
<b>Perceived Risk</b>	Total Killed (per cap)	.00168 (.00942)	.00001	231
	Total Affected (per cap)	.00001*** (.00003)	.00009	224
	Total Damages ('00000)	-.00000 (.00000)	.00001	231
<b>Economic Conditions</b>	State Domestic Product (per cap, '00000)	.00000* (.00000)	.00002	217
<b>Electoral Conditions</b>	Election Year	.00001 (.00005)	.00009	210
	Effective Number of Parties (Seats)	-.00006*** (.00002)	.00002	210
<b>Bureaucratic Capacity</b>	Petty Corruption Level	-.00006 <sup>+</sup> (.00004)	.00007	140
<b>Moral Hazard</b>	World Bank Project	-.00001** (.00006)	.00002	100
	World Bank Disbursement (per cap)	.00468 (.00476)	.00001	100
	Centre-State Political Alignment	-.00005 (.00004)	.00001	203
<b>Civil Society</b>	Registered NGOs (per cap)	.16177 (.14719)	.00009	231

Table reports OLS regression coefficients for bivariate analyses, with standard errors in parentheses. For all analyses, + =  $p < .10$ , \* =  $p < .05$ , \*\* =  $p < .01$ , \*\*\* =  $p < .001$ .

**Table A2 – Perceived Risk, Economic Conditions, and Electoral Conditions are Strongest Predictors of Training Levels in Multi-variate Models**

Overall Measure	Independent Variable	Model 1	Model 2	Model 3	Model 4
<b>Perceived Risk</b>	Total Affected (per cap)	.00006*** (.00001)	.00002 (.00003)	.00006** (.00002)	.00013*** (.00003)
<b>Economic Conditions</b>	State Domestic Product (per cap, '00000)	.00010** (.00001)	.00009 (.00007)	.00004* (.00002)	.00007+ (.00004)
<b>Electoral Conditions</b>	Effective Number of Parties (Seats)	-.00001 (.00001)	-.00006** (.00002)	0.00001 (.00001)	-.00006** (.00002)
<b>Bureaucratic Capacity</b>	Petty Corruption Level	-.00001 (.00005)		-.00003 (.00004)	
<b>Moral Hazard</b>	World Bank Project	-.00001 (.00002)	-.00013** (.00005)		
<b>Constant</b>		.00003	.00031	.00005	.00017
<i>N</i>		61	91	140	210
<b>R<sup>2</sup></b>		.38	.22	.15	.17

Table reports OLS regression coefficients for multivariate analyses, with standard errors in parentheses.

# ROBERT STRAUSS CENTER

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COMPLEX EMERGENCIES  
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IN ASIA

THE UNIVERSITY OF TEXAS AT AUSTIN

2315 RED RIVER STREET  
AUSTIN, TEXAS 78712

PHONE: 512-471-6267  
INFO@STRAUSSCENTER.ORG

STRAUSSCENTER.ORG/CEPSA

Acknowledgments: This material is based upon work supported by, or in part by, the U.S. Army Research Laboratory and the U.S. Army Research Office via the U.S. Department of Defense's Minerva Initiative under grant number W911NF-14-1-0528. I am grateful to Sabhanaz Rashid Diya for research assistance.