Rationales and Instruments for Government Intervention in Natural Disasters

MICHAEL J. TREBILCOCK AND RONALD J. DANIELS

The world, over the course even of its relatively recent history, has known many natural disasters, including earthquakes, volcanic eruptions, tsunami, hurricanes, floods, droughts, and pandemics. The 1918–1919 Spanish flu pandemic killed more than 20 million people (some estimates run as high as 50 million). The current AIDS pandemic has already killed more than 20 million people (most in sub-Saharan Africa), and there are serious concerns that a new avian flu pandemic could kill hundreds of millions of people around the world. The recent earthquake in Pakistan is estimated to have killed over 70,000 people. The tsunami in the Indian Ocean in December 2004 killed 300,000 people (Winchester 2003; Winchester 2005; Barry 1997). Richard Posner, in his recent provocative book, *Catastrophe* (2004), worries about much more remote but more devastating natural disasters such as asteroid collisions with the earth or extreme forms of global warming followed by an ice age.

Although hurricanes and floods may not be as catastrophic as some natural disasters, such as asteroid collisions or medical epidemics, we focus on them and on the role of government in natural disasters with which there is first-hand and recent experience. In examining the role of government in responding to natural disasters we seek to understand the normative rationales for government intervention and the instruments, both *ex ante* and *ex post* a disaster, that governments can actually use to intervene. In doing so, we evaluate how effective a given instrument is likely to be in vindicating a particular rationale for intervention and at what cost (public and private). We then ask how well actual government policy-making in the recent past in natural disaster contexts comports with this analysis. To the extent that there are major divergences, we explore whether these simply reflect policy misjudgments or errors—to give a public choice or political economy perspective its due—or whether they reflect systemic infirmities or vulnerabilities in the political and policy-making process. Policies that did not substantially correct problems can be altered

in the future through superior information or ideas. Systemic infirmities or vulnerabilities in the political process pose a more daunting challenge and require us to investigate whether there are strategies or mechanisms whereby governments can credibly commit themselves *ex ante* to pursuing more normatively coherent or defensible policies (Iacobucci, Trebilcock and Haider 2001; Daniels and Trebilcock 2005).

Rationales for Government Intervention

In considering the various rationales for government intervention, we acknowledge the complex interplay between our positive and normative analysis. On the one hand, natural disasters engage certain normative concerns that justify government intervention, even though state action was not the source of the risk in question (although government failure to address these risks may contribute to the public injury sustained) because of the highly concentrated (and often recurrent) losses they inflict on certain segments of the population. On the other hand, there are a host of other foreseeable shocks that inflict concentrated losses on certain communities but which nevertheless do not command the same political salience.

A libertarian perspective in responding to natural disasters would emphasize the importance of individual autonomy and view individuals as possessing the ability to determine for themselves a view of the good life, subject to avoiding actions that deprive other individuals of similar scope for the exercise of individual autonomy. This perspective would imply a minimal role for government and in particular would resist coercive government policies such as constraints on locational decisions or housing preferences through zoning laws or building code requirements or mandatory insurance, but conversely would view government as having no responsibility to individuals for the consequences of their choices in this respect and would oppose policies that permit individuals to externalize all or some of the costs of their decisions onto others through, such as subsidized insurance or disaster relief. However, where choices do not reflect underlying preferences, because they are predicated on false information about relevant costs and benefits of alternative choices, there may be a role for a soft form of paternalism in regulating the accuracy or provision of such information (Sunstein and Thaler 2003; Camerer, Issacharoff, Lowenstein, O Donaghue, and Rabin 2003).

This is not to say that governments, particularly lower level governments, would be precluded from offering citizens a matrix of policies aimed at addressing the risk of natural disasters under a libertarian model. It is possible that different governments could develop different policy bundles to respond to the threat of natural disasters, and then foot-

loose citizens could migrate to the government offering the most congenial mix of policies. Different governments could decide, for instance, to make differential investments in public infrastructure designed to reduce the risk of community injury, could impose different levels of regulation on private development in the jurisdiction, or could commit to provide different levels of social insurance in the event that a natural disaster occurred and inflicted damage. Of course, for such a Tiebout selection process to work, citizens would require accurate information respecting the content of different policies offered by different governments, competing governments would need to have the scope to differentiate their policies regarding the risks of natural disasters without the prospect of policy negation by, or risk externalization to, higher levels of government, and finally competing governments would be precluded from changing their policy mix opportunistically after migrating citizens made sunk investments in the jurisdiction.

A corrective justice approach would attach particular normative salience to providing legal redress for victims harmed by either private or public wrongdoing such as negligence. For example, if the consequences of a natural disaster were exacerbated by the negligence of government officials (or their agents) in the design and maintenance of public infrastructure, such as levees or flood works, or negligent provision of public information on underlying risks or imminent storms, corrective justice theorists would think it is appropriate that relevant government agencies and their officials should bear responsibility for the consequences of their wrongdoing to persons harmed thereby (although causal attribution of losses to particular acts of negligence may be problematic). More controversially, the dictates of corrective justice might suggest special claims for relief from the effects of natural disasters where these bear disproportionately on low-income blacks concentrated in urban ghettos (such as some of the most vulnerable wards in New Orleans) if these are the legacy of a prior history of racial discrimination (see Fiss 2003 and commentaries thereon). However, to the extent that interventions predicated on corrective justice require a demonstration of government fault that must be determined in contested and complex judicial proceedings, the provision of assistance to citizens in need may face endemic and wrenching delays. This is obviously a salient issue in the context of Hurricane Katrina given allegations of government negligence in the design and operation of various infrastructure assets in New Orleans.

From an economic efficiency perspective, which is closely congruent in important respects with some strands of utilitarianism, one would ask whether in natural disaster-prone areas of the kind that we are contemplating, there is some form of market failure that government intervention might plausibly remedy. In the case of hurricanes, a number of

important potential precautionary strategies that are designed to minimize the expected costs or consequences associated with a natural disaster (but not the risk of its occurrence, which we are assuming to be exogenous) have many of the characteristics of public goods and if left purely to private markets are likely to be under-demanded and under-supplied as a result of collective action problems. The case for intervention is heightened when government-sponsored infrastructure projects enjoy significant economies of scale, require the exercise of powers of eminent domain to develop the projects, and/or exhibit natural monopoly characteristics. As with many other forms of public infrastructure, this appears to be true of precautions such as construction of dams, levees, dikes, and other forms of flood works where public involvement would seem likely to yield more socially optimal levels of investment than purely private decision making. This may also be the case with respect to various forms of information that exhibit public goods characteristics—for example, the generation and provision of information relating to the underlying risks and expected costs of locating in vulnerable areas, weather forecasts of impending storms and their likely severity, and so forth. However, in each instance, the case for the superiority of government as opposed to private delivery (or, at least, subsidization) of the goods and services in question requires careful analysis. Governments, for instance, may not be the most efficient supplier of a structural mitigation project, and private sector development, albeit with public sector subsidization, may be optimal (Daniels and Trebilcock 1996). In a similar vein, reductions in the cost of information gathering and analysis as a result of technological innovation, coupled with the existence of endemic agency costs within government bureaucracies, may negate the desirability of vesting government with an exclusive role in this area. Finally, irrespective of whether government directly supplies or subsidizes a structural mitigation project, we have yet to discuss the nature or scale of investment by government that might be socially optimal with respect to these kinds of precautions, which is an issue we return to below.

Beyond public investments in *ex ante* precautions or information, there is a more debatable case for government provision or subsidization of insurance for the risks associated with these natural disasters on the grounds that private insurance markets are unlikely to work well or at all in these contexts. Kunreuther and Roth argue that market failures in the insurance industry are a result of ambiguity, correlated risk, adverse selection, and moral hazard (1998). The problem of correlated risk is particularly acute in the contexts of concern to us. A crucial feature of insurance markets is risk aggregation, also known as the law of large numbers, which specifies that for a series of independent and identically distributed random variables, the variance of the average amount of the claim payment

decreases as the number of claims increases. However, catastrophic risks of the kind we are considering are not independent variables; rather the risks are highly correlated, meaning that numerous losses occur simultaneously from a single event. Private insurers who write hurricane, flood, or earthquake insurance in disaster-prone areas are carrying an extremely risky portfolio of policies, which risk can only be partly mitigated through laying off the risk through re-insurance. Thus, there is the threat of insurer bankruptcy when losses eclipse the assets that insurers have on hand. Compounding the problems with private insurance is the existence of endemic cycles in insurance markets that periodically cause the withdrawal of insurance coverage from the market, and which make it difficult for consumers to secure comprehensive insurance against certain risks at any price. Thus, purely private, unsubsidized hurricane, flood and earthquake insurance is either not available at all in disaster-prone areas of the U.S. or is extremely expensive, pricing many consumers, especially low-income consumers, out of the market.

Whether government can mitigate these failures or limitations of private insurance markets is controversial. Kaplow (1986) and Priest (1996) both take the view that government-provided insurance does not reduce the risk faced by government, relative to private insurers, but simply spreads it over the body of citizens at large, at least if rates do not reflect the actuarially fair rates for different risk classes of the population, and is in effect a form of income redistribution from them either as taxpayers or as mandatory rate-payers to individuals who choose to locate in disaster prone areas, but who do not now face the full costs of their decisions. On this view, problems of adverse selection and moral hazard that private insurance markets have to manage (through deductibles and co-insurance, for instance) are exacerbated, not mitigated. To the extent that government abandons any attempt to price this insurance or to require its purchase, and instead relies on *ex post* disaster relief, these adverse selection and moral hazard problems will be even further exacerbated.

A distributive justice perspective, at least in its Rawlsian form (which focuses on the welfare of the least advantaged members of society), would assign overriding weight to public policies that benefit these citizens. Because individuals who settle in disaster prone areas are often disproportionately (but by no means exclusively) representative of least advantaged groups (as in the case of Hurricane Katrina), in part because property values and rentals in disaster-prone areas tend to be lower than in other areas, their plight will engage the special concern of distributive justice theorists and are likely to elicit support from them for investments in *ex ante* precautions and for generous forms of *ex post* disaster relief—in sharp contrast to the previous normative perspectives.

A communitarian perspective, like a distributive justice perspective,

tends to focus on the effects of a natural disaster and not its causes. Communitarians see individuals as incomplete and unintelligible outside their social relationships and social context and are likely to favor generous government investments in *ex ante* precautions to protect vulnerable communities and generous *ex post* disaster relief assistance to help rebuild existing community and social organizations and the social networks surrounding them. Conversely, in contrast to a distributive justice perspective, they are likely to disfavor policies that would entail relocation of individuals and families to less disaster prone areas, such as may be entailed in some forms of voucher proposals (see Glaeser 2002), or proposals to adopt stringent zoning and building code laws that would compel relocation of many existing residents to other communities. Equally, they are likely to be opposed to mass public housing projects such as the 300,000 unit trailer parks that FEMA has proposed (*The Economist* 2005b, 29, 30) on the grounds that by concentrating members of least advantaged groups in these artificial "communities," all the social and economic pathologies that low-income housing analysts have identified with mass public housing projects in the past would be exacerbated, creating the antitheses of vibrant, well-functioning communities (see Daniels and Trebilcock 2005). Of course, this still begs the question on where (and how) citizens displaced by a disaster should be located.

The lack of congruence among these major normative perspectives on both the rationales for government intervention in natural disasters and the choice of instruments that might be deployed by government to vindicate these rationales is, of course, disconcerting and significant. As we have already acknowledged, we have no meta-theory that enables us to resolve these fundamental incongruencies or to rank these normative perspectives in order of normative salience in a particular context. Moreover, this incongruence carries with it a political risk that politicians motivated to act only by virtue of a political support maximization imperative will be able to find normative cover for these self-serving policies in one or another of the above perspectives, enabling them to appeal not only to the self-interest of beneficiaries of policies espoused for this reason, but also to the values of other citizens who do not share these interests. Thus, almost any politically self-serving policy can be given a veneer of an apparently plausible normative justification. This problem of political dissembling or opportunism is particularly acute in the case of the natural shocks of the kind that we are considering, where the costs entailed are typically geographically concentrated, while many of the potential policy responses entail spreading the costs of intervention diffusely over a much broader base of citizens and tax payers, rendering the beneficiaries of these policies much more politically salient than the cost-bearers.

How can this daunting dilemma be addressed? Here we believe that

Lindblom provides useful advice (1959). When disagreement over the most important value to be pursued in a particular policy context is insurmountable—and such disagreements are legion in practice—government decision makers and their critics should focus on particular policies, rather than on values in the abstract. When trade-offs of incommensurable values are involved, the response in the specific case may require identifying particular policy options in order to evaluate the normative objectives in a meaningful way. That is to say, a given policy instrument may have enormous long-run negative efficiency consequences, while only modestly, or at all, advancing other normative objectives relative to other policy options. Again, certain policy options motivated by distributive justice or communitarian concerns may have less deleterious long-run efficiency consequences than other policies motivated by these concerns. None of these trade-offs can be brought sharply into focus in the abstract, but require evaluating one policy instrument against another in a particular context in terms of their relative impacts on this range of normative values or objectives. In this spirit, we turn briefly to a review of two case studies that we have developed in our previous work that we think usefully illuminate this approach, the 1993 U.S. Midwest flood and the 1997 Red River flood (both of which we acknowledge, while serious disasters in their own right, entail dramatically more limited economic and social consequences than Hurricane Katrina),[1] and extend the policy implications of these two case studies to Hurricane Katrina.

The 1993 U.S. Midwest Flood, the 1997 Red River Flood, and Hurricane Katrina

In 1993, unusually heavy snowmelt, excessive and prolonged rainfall in the upper Mississippi River Valley and the Great Plains, and subsequent soil saturation combined to produce one of the most damaging disaster events in U.S. history. At their peak, the floodwaters covered approximately 20 million acres of land in nine states. The flood was estimated to have caused 52 deaths and property damage in the amount of $12.7 billion to 70,000 homes and buildings, and to have left more than 74,000 people homeless. Total economic losses were approximately $18 billion. Although the flood-affected area contains only 10 percent of the population, it supports nearly 20 percent of all farm employment. The flood destroyed 5.1 million acres of corn and 3.1 million acres of soybeans. The closure of the upper Mississippi River rendered more than 2,000 barges idle for nearly two months and produced losses to barge companies in the amount of $600 million. Rail traffic was also brought to a standstill. Physical damage to railroads and revenue losses ran in the amount of $240 million and $169 million respectively. A history of flooding in these areas has

driven down property values, with housing in low-lying regions available at the time at prices below $25,000, meaning that lower-income households, elderly couples, young families, people on assistance, and mobile-home dwellers often inhabit flood plains.

Four years later in 1997, a combination of extreme natural circumstances, including high soil moisture, heavy winter snow fall, and a major late spring blizzard, produced what was dubbed the flood of the century in the Red River Valley, first hitting North Dakota in mid-April and then spilling northward into Manitoba. North Dakota was severely affected: 40 percent of the state's economy directly depends on agricultural production, and close to two million acres of farmland were left submerged. Floodwaters were estimated to have immersed 90 percent of the town of Grand Forks and damaged 11,000 houses and buildings. The National Weather Service drastically underestimated the depth of the approaching torrent by four feet (arguably negligently), enough to drown the whole town, and discouraging feasible emergency mitigation measures. Down river, Manitoba had more time to adjust forecasts of the impacts of flooding and to prepare accordingly but the damage was still considerable. In all, 28,000 Manitobans were evacuated from flood risk areas, and 5,200 residences and businesses were damaged. The flood inundated 5 percent of Manitoba's farmland—some 200,000 hectares. The damage would have been worse, especially in Winnipeg, the provincial capital, were it not for the Red River Floodway, a forty-seven-kilometer channel completed in 1968, which directs a portion of the Red River to flow around Winnipeg during floods. Unfortunately, two nearby towns, Saint Agathe and Grand Pointe were severely damaged in the flooding, in part as a result of the diversion of water away from Winnipeg through the Floodway and related ring dikes.

In both the Midwest and Red River floods, structural flood control projects continue to play an important role in the management of the flood plains. As of 1996, Myers reports that the U.S. federal government had spent over $11 billion to protect the country's flood plains through levees, dams, and reservoir projects (Myers 1996). However, Grand Forks did not have much permanent flood protection in place at the time of the Red River flood, relying instead largely on hastily constructed, temporary dikes to keep the flood waters out, a situation in stark contrast to that in Manitoba, which had a good deal of permanent flood protection. The Manitoba Water Commission reports that in the absence of the Floodway, which cost a total of $63 million to build, losses within the city of Winnipeg could have reached 5 billion to 7 billion Canadian dollars (as opposed to about $37 million actually incurred). The U.S. Army Corps of Engineers estimates that the levees and dams prevented more than $19 million in potential damages in large cities such as Kansas City and St. Louis in the

Midwest floods (Iacobucci et al. 2001). In the U.S. Midwest, the few cities that were flooded were those protected only by privately built levees that were not well constructed. The suburbs and agricultural lands did not fare well either; several suburbs suffered severe damage and hundreds of thousands of acres of farmland and countless homes and businesses in nine Midwestern states were swamped. The waters that flooded agricultural land mostly broke through or swept over levees not as tall as those guarding the cities.

At first blush this evidence suggests that investments in structural flood control projects have large social pay-offs that more than justify the expenditures involved. However, some caution here is required. For example, the comparison above of the costs of the projects relative to losses avoided are misleading in that these losses need to be, first, discounted by the probability of their occurrence, and second, discounted to present value terms so that up-front expenditures on structural flood control projects can be accurately compared with their expected benefits (in present value terms) (Posner 2004). Thus, to take the case of Hurricane Katrina and New Orleans, some estimates of potential federal assistance to New Orleans run, in an extreme case, as high as $200 billion, which of course does not include the 1,000 deaths entailed or costs incurred by other levels of government or private costs incurred by homeowners, businesses, local residents and insurers (Glaeser 2005). Generally, these kinds of damage figures are often compared with the much smaller costs of maintaining or improving the levee system around New Orleans. Whether this expenditure is socially justified or not can only be determined by comparing it with the expected benefits of the expenditure which is presumably the cost of another major hurricane discounted by the probability of its occurrence over the useful life of these levees and discounted again to present value terms. Thus, it cannot be the case that spending, for instance, up to $200 billion on structural flood control projects, or anything like this, could be socially justified. Richard Posner gives the following example ("Lessons of Katrina" forthcoming):

> A study in 1998 had estimated that New Orleans could be made safer—but not completely safe—against flooding caused by powerful hurricanes, at a cost of $14 billion, by restoring and sustaining Louisiana's coastal ecosystem. The Army Corps of Engineers had estimated a close to 1/300 annual probability of a disastrous flood, and that equates to a probability of almost 9 percent over a 30-year period. That is a high probability, but a $14 billion expenditure that would not make New Orleans safe, but only safer, may not have been cost-justified after all. Suppose the damage inflicted by such a flood were estimated at $200 billion; then, as a first approximation, preventive measures that reduced the probability of the flood from, say 9 percent to 3 percent would not be cost justified if they cost more that $12 billion (6 percent of $200 billion).

For smaller communities and agricultural land, with low density populations, erecting effective levees the length of the Gulf Coast is unlikely to make any economic sense. Moreover, costs and benefits need to be compared at the margin. As Posner notes, even a substantial additional expenditure on levees and the like is unlikely to reduce to zero the expected costs of a future hurricane of Hurricane Katrina's intensity or worse (and, even if it would, there are still substantial time lags in constructing these changes that would entail risks for residents). That is to say, one could, for example, raise levees by two feet (or increase their thickness) and reduce expected costs of a hurricane somewhat, raise them four feet and reduce expected costs somewhat more, and so forth, but any sensible assessment of socially justified investments in structural flood control will surely mean that there is some residual risk for residents of these areas that require control or insurance by individual citizens. Given this residual risk, levees may give people a false sense of security, but in any event will have the effect of encouraging more intensive habitation and development of the flood plains, and discourage what may be a socially less costly mitigation strategy, such as securing crop insurance for flooding of agricultural land, or relocation. In other words, the socially optimal level of investment in structural flood control projects can only be determined relative to costs and benefits at the margin of alternative *ex ante* and *ex post* mitigation strategies. *Ex ante* a major natural disaster, there may be a tendency to ignore or under-estimate low-probability risks and under-invest in precautions (Kunreuther 1996). Politicians will rationally neglect the need to invest in low-probability events if they believe that the occurrence of such an event is likely to occur outside their expected tenure in government and they will therefore will not suffer any personal consequence from having under-invested in socially desirable projects. Their failure to invest is further assured by the lack of sustained attention that media gives to the prospect of low-probability events (at least as against other more concrete "here and now" issues) and the coordination problems that interested citizens face in advocating for such investment. *Ex post* a disaster, influenced by the availability heuristic, there may be the opposing danger of over-investment in *ex ante* precautions Sunstein 2002). This is particularly problematic when reliance on these precautions limit use of more efficient solutions such as subsidized citizen re-location to safer and perhaps more economically dynamic communities.

Even if politicians were minded to make socially optimal investments in structural mitigation in relation to low probability events, there is still the challenge of who can be entrusted with the task of undertaking robust cost-benefit analyses of alternative projects. Quite apart from the difficulties that inhere in making accurate assessments of the likelihood of different stochastic events, cost-benefit analysis is notoriously vulnerable to

manipulation as a result of the scope for choice in selecting different values for the costs of injury, the benefits of prevention and discount rates.

Nevertheless, structural flood control measures are congenial to many of the normative perspectives reviewed above. First, they are likely, up to some level, to be efficient social investments. Second, they reduce the expected costs of flooding to least advantaged citizens. And thirdly, they protect and preserve existing communities. And quite apart from the normative perspectives we have identified, use of structural flood control measures has desirable political properties because of the symbolic value to politicians of demonstrating progress on an issue. For libertarians, however, such expenditures are likely to be less congenial, particularly if they are not financed either privately or collectively by the residents of these disaster-prone areas themselves, but by taxpayers in other communities who are, in effect, being coerced into underwriting the locational choices of others.

Before the 1993 U.S. Midwest flood, no North American jurisdiction had employed buy-out and relocation strategies to reduce the consequences of natural disasters, but they emerged at the forefront of U.S. federal flood reforms as an instrument warranting attention along with that of structural control works. Under the Hazard Mitigation and Assistance Act of 1993, Congress legislated that funds be made available for projects to acquire and demolish homes that should not be rebuilt, to elevate at-risk buildings or relocate them to higher ground, and flood proof at-risk structures (Quinn, 1996). Several communities accepted the federal government's proposal and removed homes and businesses from flood plains. Within three years of the 1993 Midwest flood, the federal government, with the aid of state and local governments, had removed or relocated more than 8,000 families from flood hazard areas in the Mississippi and Missouri water basins and, in the process, converted more than 100,000 acres of partially flooded farmlands into wetlands, which serve as a sponge for rising waters, and offer an attractive alternative for meeting future flood control needs. Commentators estimated that when the program was implemented it would save some $200 million over twenty years, even without another near record flood, and that while the initial cost of relocating communities would be substantial, the price would be a one-time only payment and people in these communities, once moved, would never be returned to the flood plain and taxpayers would never again have to pay literally to bail them out of a problem that had been anticipated. Government could simply make it illegal for individuals and communities to return, credibly committing itself not to compensate future flood victims and therefore alleviating the moral hazard that may explain many people's decision to stay on the flood plains. The difficulty of making a credible political commitment not to help flooded communities

may be a major reason why subsidized relocation is economically desirable; it helps government to commit itself not to help those who do not relocate. However, the U.S. buy-out program has not been without its controversies. Economists at the University of Missouri estimated that their state would lose $200 million U.S. a year in economic activity and 3,200 jobs if farmers cease planting in the flood plain. As a result, the federal government and the landowners sought a compromise that would move many homeowners out of the flood plain while leaving farmers and businesses there if they insure themselves against the flood risk. The insurance requirement would help solve the problem of farmers not internalizing the risks associated with agriculture on flood plains. Of course, another difficulty with buyouts emanates from the adverse impact on the welfare of government officials (both elected and unelected) in the jurisdiction having experienced a natural disaster. Outward migration necessarily entails a loss in the number of residents and the size of the tax base, and may trigger a contraction in the size and influence of local government that invites a backlash from residents remaining in future elections.

A variant on this strategy has been proposed by Harvard economist Edward Glaeser (2005). Glaeser notes that New Orleans reached its peak of economic importance to the U.S. in 1840. New Orleans began to decline, in absolute terms, in 1960. Its population declined from 627,000 residents in 1960 to about 445,000 in 2004. The 2000 Census reported that more than 27% of New Orleans' residents were in poverty (relative to 12% for the U.S. as a whole). The New Orleans median family income was only 64% of the median family income in the U.S., and in 2004 the unemployment rate for the city was over 11%. Glaeser argues that there is a big difference between rebuilding lives and rebuilding communities. He invites us to imagine that on one scenario we will spend $100 billion on infrastructure for the residents of the city, but on an alternative scenario, we would give each one of the city of New Orleans residents a check for more than $200,000—enough to send several children to college, to buy a modest home, and/or to relocate and start a dreamed-of business. If this money were spread over the 1.33 million residents in the larger New Orleans metropolitan area, each resident would still receive $75,000, still enough to pay for a home in many areas of the country. This proposal, while provocative, needs further amplification and refinement.

First, although Hurricane Katrina did inflict significant concentrated losses on the residents of New Orleans, it is not clear that the *actual harm* suffered by many citizens (in terms of the loss of physical assets) is qualitatively different from losses that citizens routinely suffer in their housing and other investments as a result of different exogenous shocks that may, indeed, implicate deliberate government policy (such as trade liberalization, macro-economic adjustment policies). Further, as we point out in

Rethinking the Welfare State: The Prospects for Government by Voucher, voucher proposals such as Glaeser's raise some difficult design issues. Is the $200,000 check that he imagines for each resident of the city of New Orleans an untied cash transfer that they are free to spend on anything they like, rather akin to the proposal by Bruce Ackerman and Anne Alstott in *The Stakeholder Society* (1999), where they propose that every American citizen who has graduated from high school and avoided significant criminal activity would receive an untied flat grant of $80,000, to be spent as he or she sees fit—a proposal that has attracted a range of legitimate criticisms, including excessive expenditures on consumption or risky investments, predicated on the ability to externalize costs onto the social welfare system in the event of exhaustion of these resources (Daniels and Trebilcock 2005)? If these vouchers are tied, instead, to particular classes of goods or services, how are these conditions to be defined (in terms of eligibility for receipt of vouchers and on required forms of expenditure)? Moreover, in order to avoid severe moral hazard problems of people relocating in disaster-prone areas, would payment for housing amenities be conditional on relocating to non-disaster-prone areas—perhaps other cities in Texas or in neighboring states? (Daniels and Trebilcock 2005; Fiss 2003)[2] If the vouchers are so conditioned, this may attract objections from communitarians who will see such a scheme as undermining the pre-established social fabric of communities in New Orleans (see Steven Gregory in Fiss 2003). On the other hand, it seems preferable, perhaps even on communitarian criteria, to FEMA proposals to build massive trailer parks of up to 300,000 units in New Orleans, which seems scarcely designed to promote vibrant and well-functioning communities. Libertarians may also be concerned that personal choices are being coerced through conditions attaching to receipt of these vouchers. One option may be, as in the 1993 U.S. Midwest floods, to allow people to remain in flood-prone areas, but only on the condition that they obtain and maintain a specified minimum level of coverage of flood and hurricane insurance, and that this condition is more effectively enforced with respect to all residents than it has been in the past. However, such a decision should not qualify for eligibility for a voucher designed to induce individuals to relocate to safer communities. Again, here a critical issue is the credibility of government pre-commitments and not the bailing out, through recurrent disaster relief, of people who choose to make risky locational decisions. Finally, what is the argument for a universal voucher for all citizens of New Orleans, irrespective of means or losses incurred? At the present time, there is discussion that FEMA intends to make housing vouchers available to all residents whose homes were located in areas (as determined by aerial surveys) that suffered the greatest damage even without a demonstration that the prospective recipient did not hold insurance or

did in fact suffer damage. From a distributive justice perspective, there would be much more to be said for targeting these vouchers on a means-tested basis on low-income citizens of New Orleans and other affected communities (see Daniels and Trebilcock 2005).

Some jurisdictions have used zoning regulations to prevent habitation or development of the highest risk areas of flood plains. However, higher levels of government have difficulty in promoting such regulations, because of the need to garner cooperation from local governments with jurisdiction over zoning issues and who often have been unwilling to impose or enforce such regulations because of the desire for unconstrained development and the larger property tax base that this entails, given the ability to externalize the costs of disaster relief to higher levels of government. It is indeed noteworthy that despite the frequency of natural disasters suffered by Louisiana, the state is viewed as having chronically lax building code and zoning requirements. Just as one is properly concerned about individuals externalizing onto others some or all of the costs of their locational decisions through the provision of disaster relief assistance, there is also legitimate concern over inter-jurisdictional externalities where one level of government externalizes all or part of the costs of its decisions onto other levels of government. One option that the U.S. federal government has pursued in the past is to address the problem of misaligned local government incentives by linking the provision of federally subsidized insurance to communities to the development and enforcement of zoning legislation and building standards designed to mitigate the consequences of natural disasters. One concern with this set of policies is that they may impose an overwhelming economic burden on those who have to replace or repair their property or also elevate or relocate their homes or businesses—a burden that is likely to be most severe for low- or fixed-income individuals and families and may engage the concerns of distributive justice proponents. Thus, it is likely that policies relying on zoning regulations and building standards would have to be linked to buy-out and relocation policies. Moreover, there are inherent limits to the application of zoning regulations and building standards, rendering them applicable only to the highest-risk areas of natural disaster-prone regions. For example, zoning all of New Orleans as non-residential is unrealistic, so that (or with structural mitigation measures) residual risks will remain. Thus, in a second-best world where the credibility of government precommitments is a serious issue, they might be persuaded to accept as unavoidable, a combination of buy-out/relocation and zoning regulation and building standard policies that constrain individual choices if adverse selection and moral hazard problems are to be contained in individual locational decisions that are predicated on externalizing a

large faction of the costs of those decisions onto other members of the community through disaster relief.

As noted earlier, private flood and hurricane insurance markets are almost non-existent in many parts of the U.S. In 1968, the U.S. Congress, in recognition of the limits of private disaster insurance markets, created the National Flood Insurance Program (NFIP) to provide relief from the impacts of flood damages in the form of federally subsidized flood insurance to participating communities, contingent on flood loss reduction measures embodied in local flood plain management regulations. However, despite the availability of subsidized insurance at rates that averaged only one-third of actuarial rates for such insurance, as at the time of the Midwest flood apparently only about one in four people on flood plains had bought it. This outcome seems attributable in part to the existence of extensive relief payments (but see Kunreuther 1996).[3] FEMA provides disaster relief that is generous enough to dissuade many people from purchasing insurance protection. For example, in total, insurance claims for the Midwest flood amounted to $250 million, in contrast to the $6.4 billion paid out in federal assistance (to repair public infrastructure as well as compensate individuals for losses). Apparently many property owners who were harmed by the 1993 flood and did not hold federal flood insurance nevertheless received federal disaster assistance in amounts nearly equal to benefits provided to property owners who were insured. The U.S. federal government has attempted to address some of these concerns. In September 1994, Congress passed the National Flood Insurance Reform Act which imposed penalties on lenders who do not ensure that mortgage holders obtain flood insurance; it also closed a loophole that allowed borrowers to drop the insurance after obtaining a mortgage. Further, after the Midwest flood, the NFIP was amended to provide coverage not simply for repairing flood damaged homes but also mitigation coverage that would enable an owner to pay for additional measures to prevent or reduce future flood damage, including relocating the structure or elevating the foundations or flood proofing. However, despite all these attempts to increase flood insurance coverage, the *Economist* magazine recently reported that in Mississippi's coastal areas, less than one in five households have flood insurance and in New Orleans under half (2005b, 30). Renters and those who own homes outright without mortgages are the most likely to be uncovered (*The Economist* 2005a).

In the wake of the 1993 Midwest flood, the U.S. Small Business Administration (SBA), which provides loans to businesses *inter alia* that suffer property and other economic losses stemming from a natural disaster, approved more than 20,000 subsidized loans. These loans, because in theory they must be repaid, involve (depending on the extent of the subsidy) greater internalization of costs of individual locational decisions than dis-

aster relief. However, in practice businesses that have the most success in obtaining SBA disaster loans were those that would have qualified for commercial loans relatively easily and conversely the businesses that had least success in acquiring SBA loans were firms which would have found it difficult to qualify for and obtain private commercial loans, suggesting that the beneficiaries of loan subsidy and guarantee programs generally come from middle- and lower-middle-income strata and that the least advantaged are not much helped, offending some notions of distributive justice.

Federal disaster relief has a long history in the U.S., dating back to the last years of the eighteenth century and arguably provided much of the political genesis for the New Deal social welfare programs (Landis 1999; Landis 1998; Moss 1999). As Michele Landis argues, social and political construction of claimants for relief as helpless victims of external forces beyond their control ("Acts of God") have exerted an enduring influence on American political discourse, which has manifested itself in heavy reliance on prior political precedents and analogies in constructing responses to current disasters ("natural," social or economic) (see also Bumiller 1998). Some political constituencies have invoked the precedents and analogies to argue for a broader social safety net, while other constituencies have invoked the helpless victims of uncontrollable forces to argue for a minimalist U.S. social welfare system.

After both the 1993 Midwest flood and the 1997 Red River flood, the U.S. Congress authorized large amounts of funding in emergency aid. In the context of Hurricane Katrina, President Bush has promised to do "whatever it takes" to rebuild New Orleans and other affected Gulf Coast communities, with enormous figures for federal assistance being frequently quoted—up to the $200 billion range. However, *ex post* disaster relief, as already noted, has all kinds of perverse incentive effects, severely exacerbating problems of adverse selection and moral hazard in locational decisions by enabling residents of disaster-prone areas to externalize a large fraction of the cost of their locational decisions onto other members of the community. Hurricanes are an annual occurrence on the Gulf Coast (albeit not of the severity of Katrina). As Priest notes, studies of the 1993 Midwest flood demonstrate sustained and repeated losses from disasters, year after year, in the same counties or states (Priest 1996). Tom Szilaszi, a building commissioner in St. Charles County, Missouri, was quoted in *Newsweek* (August 2, 1993) as saying, "Taxpayers have bought some of these people refrigerators and chainsaws ten times over." These relief programs not only create perverse incentives at the individual level, but provide disincentives for states and communities to develop effective flood prevention strategies because they fail to internalize the costs of natural disasters, given the knowledge that federal disaster relief is available.

Disaster relief produces disincentives for flood mitigation in that communities that sustain the most damage often receive the most assistance. Those are the ones that government is prone to declare disaster areas. Consequently, communities that aggressively pursue flood prevention strategies, yet still end up with losses, wind up paying twice for their efforts.

This is not to say that all expenditures on *ex post* disaster relief or emergency services can be dispensed with. Some of these expenditures represent general investments in emergency services (themselves a form of public good) that can be applied to many types of risks and locations, relative to specific *ex ante* investments in particular risk mitigation. However, it is not clear to us that institutional arrangements that are appropriate for implementing emergency measures after a disaster has occurred (crisis response) are also the appropriate institutional arrangements for long-term forward planning of mitigation measures before a disaster has occurred (given the three levels of government with jurisdictional mandates in this context, which in turn may not be appropriate for planning the long-term recovery of devastated regions. More generally, relative to the other natural disaster mitigation policies available (reviewed above), the wholly disproportionate historical emphasis, in terms of resources entailed, on *ex post* disaster relief dooms the federal government to massive recurrent financial exposures to residents of disaster-prone areas, not only in the case of Hurricane Katrina, but in other future cases of natural disasters, such as flooding, hurricanes, or earthquakes, where federal policies in the context of the current disaster will obviously be relied on (as they have been throughout the country's history) as a political precedent for equality of treatment by affected citizens in future natural disasters. Thus, of all the mitigation strategies reviewed, massive *ex post* disaster relief seems to exhibit much less attractive normative properties than any of a number of feasible combinations of the other mitigation strategies reviewed.

Thinking in terms of tiers of risks, and focusing on transition costs faced by current residents, efficient investments in structural mitigation measures would address the first tier of risk. Zoning restrictions on the highest risk locations amongst remaining risks might then be appropriate. Building Code requirements for upgrading the structure of existing and future buildings to water-proof, wind-proof, or earthquake-proof them might be appropriate for remaining disaster-prone locations, with Federal low-interest loans available on a means-tested basis to current (but not future) local residents to bring their structures into compliance (using the availability of such loans as a source of leverage on local authorities to adopt and enforce such requirements). Mandatory minimally subsidized disaster insurance, appropriately risk rated, would be required to be obtained and

maintained by all current and future residents who choose to remain in disaster-prone areas. Finally, generous means-tested inducements to relocate to less disaster-prone areas would be available to current (but not future) residents facing new zoning restrictions or building code requirements to mitigate the transition costs of new policies.

A critically important element in any such combination of policies is breaking the socially and politically constructed links between helpless victims and natural disasters described by Landis, and strengthening political and public perceptions that locational decisions can legitimately be viewed as engaging individual responsibility and the exercise of moral agency. Thus, for us, ensuring that citizens that are especially constrained in their locational choices by the burdens of race, class and poverty have realistic location options open to them beyond high-risk, low-priced disaster-prone areas, through an appropriately designed means-tested relocation housing voucher program, would assume a special importance. For those citizens who choose to remain in these areas, confronting the full social costs of these locational decisions with respect to the residual risks that cannot be efficiently reduced by structural mitigation measures, through mandatory but minimally subsidized disaster insurance seems a reasonable responsibility to ask them to bear, given that they have chosen voluntarily to decline reasonably available, less disaster-prone locational options.

Conclusion

This essay does not seek to argue for a non-interventionist strategy on the part of governments confronting the risk or reality of natural disasters. First, such a position lacks justification from several normative perspectives. Second, it is obviously politically completely unrealistic, given past experience with government interventions in such disasters. Thus, a strict libertarian perspective focusing on unconstrained individual freedom of choice seems largely unhelpful. Similarly, a strict communitarian perspective that insists on completely preserving or reconstituting preexisting communities after recurrent disasters at the cumulative expense of members of other communities seems quite unrealistic. Rather, the focus must be on the cost-effectiveness of various forms of intervention in the light of their relative impact on the normative values of economic efficiency—utilitarianism, corrective justice and distributive justice—canvassed earlier in this paper. In this context, the critical challenge is ultimately a political challenge: how can the government credibly commit to a set of policies that are normatively defensible and politically sustainable (Elster 1984; Iacobucci, Trebilcock, and Winter 2005)?

We are not dogmatic or doctrinaire proponents of cost-benefit analysis,

are sensitive to the difficulties of quantifying a number of critical variables, and are also sensitive to the noneconomic values that natural disasters legitimately engage. However, at least a cost-benefit framework (as Richard Posner argues in his recent book), sensibly deployed, enables one to identify a zone of potential policies that fall within what he calls a "tolerable windows approach," and which set of policies fall outside such tolerable windows (Posner, 2004). It seems clear to us that current U.S. policies relating to natural disasters fall outside the tolerable windows of socially optimal policies or normatively defensible trade-offs among values and instruments. Moreover, making up these policies on the fly in an atmosphere of crisis after a disaster has occurred not only risks adoption of inappropriate policies for the current crisis, but perhaps even more seriously exacerbates the risk of future policy errors by further entrenching a political precedent or path dependency effect that casts an enormous shadow over the U.S. government's already precarious fiscal imbalance.

Notes

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1. For fuller development of these case studies, see Iacobucci et al. (2001), chapter 5.

2. See Daniels and Trebilcock (2005), chapter 4, for proposals for rent vouchers for low income citizens that attempt to respond to these kinds of concerns; also see Fiss (2003), for similar proposals for facilitating exit by low-income blacks from urban ghettos.

3. Kunreuther (1996) largely discounts this explanation, based on survey evidence, and instead suggests that individuals routinely disregard very low probability risks.