

CATASTROPHIC RISK AND GOVERNANCE AFTER HURRICANE KATRINA: A Postscript to *Terrorism Risk in a Post-9/11 Economy*

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In an earlier article, published with this fine journal, I analyzed terrorism risk and its economic consequences with the caveat that the “greatest risk of exogenous shock to the industry is from a natural mega-catastrophe.”¹ Since the article addressed terrorism risk, this idea was expressed only in passing. During and since publication, a number of stunning catastrophes have occurred in various corners of the world, including the South Asia tsunami, human-to-human transmission of the H5N1 avian flu virus, and Hurricane Katrina.² In this essay, I expand my original idea and inquire into the political economy and system of governance that have made catastrophes more frequent and severe.

The nature of catastrophe, whether manmade or natural, has changed and so too must our perception and response. Like manmade catastrophes, natural disasters are not merely acts of God; rather, mortal activity can influence their causality or consequence. Individual choices and government action can amplify natural catastrophic risk. This is seen in government risk-mitigation efforts such as flood insurance and response to catastrophes, including the recent failures in New Orleans. The system of governance that is designed to mitigate risk and respond to catastrophes can be ineffective, or worse, increase the risk of harm through unintended consequences. Human influence must be considered a source of collateral risk, the kind that leads to a systemic crisis or exacerbates one. In an increasingly complex society, governance may not always entail the delivery of services so much as the coordination and management of various governmental and nongovernmental entities, and so the lack of complete control may limit the effectiveness of governance and perhaps

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1. Robert J. Rhee, *Terrorism Risk in a Post-9/11 Economy: The Convergence of Capital Markets, Insurance, and Government Action*, 37 ARIZ. ST. L.J. 435, 467 (2005).

2. The South Asia tsunami occurred during the writing of the article; the person-to-person transmission of the H5N1 virus occurred during the editorial process; and Hurricane Katrina occurred after publication.

constitute a source of risk. Finally, this essay concludes with some brief proposals, discussion topics more than completed ideas, which may facilitate further academic and political dialogue on effective governance and public risk management. They include a catastrophe tax, the elimination of subsidies for bad risks, reduction of coordination costs, and a clearer understanding of a “public-private partnership.”

I. THE ERA OF MEGA-CATASTROPHES

The world has never been more prosperous, and yet never more risky. Some dangers like pandemics and wars are old and familiar menaces. Risks like asteroid strikes are a constant, but science has engendered a new found appreciation. Risks like homicidal governments are of our own folly, while perils like nuclear power are born from the very technologies that make our lives better. Still, some dangers like tsunamis and earthquakes are made more destructive by the nation’s political economy. Catastrophic risks are parasitic to social development and technological progress, and in the dawn of the twenty-first century they are old, new and morphed. We live in an era of mega-catastrophes.

Catastrophe is loosely defined as an extraordinary event marked by tragedy or great loss.³ I say *loosely* for risk is a relative concept. “As we can only ‘lose’ what is of value to us, risks are a direct reflection of religious, social, political and economic perceptions of value.”⁴ The spread of democracy, free markets and peace has led to greater global prosperity.⁵ Because we are more sensitive to losses and less tolerant of them,⁶ our perception of risk has been heightened.⁷ From an economic perspective, an

3. The dictionary definition of catastrophe is “a momentous tragic event ranging from extreme misfortune to utter overthrow or ruin.” WEBSTER’S NINTH NEW COLLEGIATE DICTIONARY 214 (1983).

4. CHRISTIAN BRAUNER, SWISS RE, THE RISK LANDSCAPE OF THE FUTURE 19 (2004) [hereinafter BRAUNER, RISK LANDSCAPE].

5. See generally MICHAEL MANDELBAUM, THE IDEAS THAT CONQUERED THE WORLD: PEACE, DEMOCRACY, AND FREE MARKETS IN THE TWENTY-FIRST CENTURY (2002).

6. See Jon T. Hirschoff, *Recent Developments in the Law of Torts: Introduction*, 51 IND. L.J. 463, 463 (1976) (noting that society has developed an “intolerance of bad luck”).

7. Political scientists have theorized that war has become less frequent because society has become less tolerant of losses. See JOHN MUELLER, THE REMNANTS OF WAR (2004); John Mueller, *Why Isn’t There More Violence?*, 13 SECURITY STUD. 191 (2004); see also MONTY G. MARSHALL & TED ROBERT GURR, CTR. FOR INT’L DEV. & CONFLICT MGMT., PEACE AND CONFLICT 2005, at 11 (2005) (“The global trend in major armed conflict has continued to decrease markedly in the post-Cold War era both in numbers of states affected by major armed conflicts and in general magnitude.”).

extraordinary event simply means an unusual parametric loss.⁸ Although losses may be great in absolute terms, most catastrophes do not measurably affect the broader society or economy, at least in an economic sense. Great misfortune attracts broad interest,⁹ but in most cases the daily rhythms of life do not change. In this sense, catastrophes are typically localized tears in the social fabric. On the other hand, a mega-catastrophe is an event so severe that the exogenous shock of the event emanates to the broader society or economy.¹⁰ Casualties or economic consequences (or both) exceed the outer limits of perceived risk. September 11 was a mega-catastrophe, resulting in a large loss of life coupled with an adverse impact on the national economy, and it defined a new paradigm of terrorism risk.¹¹

Manmade catastrophes can easily match or exceed natural disasters.¹² Before 9/11, the worst manmade disasters had been industrial accidents, occurrences that achieved iconic stature, e.g., Bhopal, the Exxon Valdez, and Chernobyl.¹³ These accidents raised the public conscience on industrial

8. In insurance terms, a catastrophe is an event that causes \$25 million or more in insured losses and affects a significant number of policyholders. Press Release, ISO Prop. Claim Servs., Preliminary Estimate Puts Insured Losses from Hurricane Katrina at \$34.4 Billion (Oct. 4, 2005) [hereinafter ISO Press Release] (defined by ISO, a major insurance services firm). This definition makes it obvious that catastrophes routinely occur. A billion-dollar event is no longer a momentous occasion. See AURIELA ZANETTI ET AL., SWISS RE, SIGMA NO. 1/2004, NATURAL CATASTROPHES AND MAN-MADE DISASTERS IN 2003, at 9 (Thomas Hess & Aurelia Zanetti eds., 2004) (“There are strong indications that the billion-dollar loss trend will continue.”). Nor is such an event particularly ruinous for the economy or the insurance industry since both adequately spread the risks in most cases. Rhee, *supra* note 1, at 439. “While billion dollar losses are significant events, they do not pose a systemic risk to the economy.” *Id.* at 439 n.15.

9. The occurrence of recent mega-catastrophes shows that sympathy has a substantial role in providing material aid as measured by charitable giving. See Rhee, *supra* note 1, at 439 n.129 (noting the substantial charitable aid given in response to 9/11 and the South Asia tsunami).

10. In an earlier article, I defined a mega-catastrophe, for the purpose of insurance, as an event exceeding \$20 billion in insurance losses. *Id.* at 439 n.15. With 9/11 and Katrina exceeding \$30 billion in insurance losses, and as catastrophes of this magnitude become more frequent, this assessment may become obsolete with time (perhaps sooner than anticipated). *Id.* at 438; ISO Press Release, *supra* note 8.

11. September 11 also had a political and sociological dimension. We cannot underestimate the deep psychic wound to the nation and the geopolitical consequences. On a personal note, I was six blocks away in the perceived safety of my home in lower Manhattan when American Airline Flight 11 hit the North Tower, and I subsequently witnessed the collapse of both towers. The memories are still haunting.

12. See Rhee, *supra* note 1, at 447 (“[T]he potential exposure could be equivalent to the ‘Big One’—the type of mega-catastrophe that could result in a systemic failure or incapacitation of the industry . . .”).

13. See Bhopal Information Ctr., <http://www.bhopal.com> (last visited Apr. 2, 2006) (detailing the events of the 1984 Union Carbide accident at Bhopal, India that killed approximately 3800 people); Exxon Valdez Oil Spill Tr. Council, <http://www.evostc.state.ak.us> (last visited Apr. 2, 2006) (providing facts surrounding the accident); Swiss Agency for Dev. &

safety, environmental protection, and nuclear risk. Although they resulted in substantial liability for the misfeasor,¹⁴ they had no adverse economic impact on the greater society.¹⁵ The dangers of manmade accidents have always been a societal risk, but the impact on the broader economy has been small. September 11 stands apart as the only manmade disaster that has had a deep, albeit temporary, impact on the economy.¹⁶ Until Katrina, it was the largest insurance loss arising from a single event.¹⁷ The severity of the loss triggered a paradigm shift in that terrorism, once considered discrete, low intensity violence, metastasized into acts intended to yield catastrophic loss of life and economic damage.¹⁸ The attacks showed that, even with the use of low technology weapons and methods, terrorists could inflict mega-catastrophes.¹⁹ The possibility of more technically advanced attacks using nuclear, biological, and chemical weapons, once the stuff of fiction, is now real, and such an attack could eclipse the losses from 9/11 by many folds.²⁰

An intentional act like terrorism is only one source of mega-catastrophic risk. Catastrophes can result from accidents. Chernobyl and Three Mile Island showed that industrial accidents could be catastrophic in both lost

Cooperation, <http://www.chernobyl.info> (last visited Apr. 2, 2006) (providing facts surrounding the accident).

14. See Bhopal Information Ctr., The Incident, Response, and Settlement, <http://www.bhopal.com/irs.htm> (last visited Apr. 2, 2006) (explaining that Union Carbide entered into a \$470 million settlement with the Indian government for the Bhopal accident); United Nations & Chernobyl, The Russian Federation, <http://www.un.org/ha/chernobyl/russia.html> (last visited Mar. 6, 2006) (stating that the Russian government paid about \$3 billion to victims of Chernobyl); Press Release, U.S. Env'tl. Prot. Agency, Exxon to Pay Record One Billion Dollars in Criminal Fines and Civil Damages in Connection with Alaskan Oil Spill (Mar. 13, 1991), available at <http://www.epa.gov/history/topics/valdez/02.htm> (explaining that Exxon settled for \$900 million with the government and paid \$2.2 billion in clean up expenses).

15. This is not to suggest that these accidents did not affect the industry sector associated with the accident. Obviously, the perception of nuclear power changed after Chernobyl and Three Mile Island.

16. Rhee, *supra* note 1, at 448–54 and accompanying notes.

17. *Id.* at 438. Asbestos liability has produced the largest insurance loss, but obviously the liability is from a single product and not a single event. *Id.* at 443 n.32.

18. *Id.* at 443–44.

19. See *id.* at 437–38 n.4 (depicting the potential effects of a well-coordinated suicide bombing attacks against national retailers and prominent indoor malls throughout the country on the day after Thanksgiving). Terrorism is unpredictable in the individual instance, but it is not random. Over the years, terrorists, Islamic and others, have targeted economic assets such as transportation systems, financial districts, and tourist destinations. *Id.* at 531 n.448, tbls.1 & 2. The financial districts in New York and London, the airline industry, and train systems have been favored targets. The July 7, 2005, attacks against the London subway and bus systems fit this pattern. See generally CNN, London Terror Special Reports, <http://www.cnn.com/SPECIALS/2005/london.bombing> (last visited on Apr. 2, 2006).

20. The worst case scenario is a trillion-dollar loss if weapons of mass destruction are deployed. Rhee, *supra* note 1, at 447 n.52.

lives and potential economic fallout.²¹ Short of some spectacular event, it is difficult to imagine a manmade accident on a scale large enough to impart an exogenous shock on society and economy. That said, intuition tells us otherwise. Like a virus, risk is parasitic to human development, e.g., development of coastlines along storm paths, invention of technology like genetically modified foods, and concentration of economic resources in mega-cities. Consider also such vital technology as the Internet and power. A global failure of the Internet through cyberterrorism or a prolonged power grid failure would have mega-catastrophic economic impact with minimal loss of life.²²

The first task in risk management is identification and assessment of the risk. In *Catastrophe: Risk and Response*, Richard Posner examines the profound problem of civilization—apocalyptic catastrophes “that threaten the survival of the human race.”²³ He identifies a litany of scenarios, including some obvious risks like pandemics, nuclear fallout, terrorism, and irreversible environmental degradation (e.g., global warming, loss of biodiversity and exhaustion of natural resources).²⁴ Augmenting this list are more exotic perils including killer asteroids, strangelets (subatomic particles) that condense the earth into a hyperdense sphere in a runaway chain reaction, omnivorous nanomachines that consume natural life, and intelligent machines that enslave humans similar to the scenario depicted in the movie *The Matrix*.²⁵ Although some of the discussion seems like speculative conjecture of science fiction,²⁶ the point that risks are varied and perhaps hidden through distortions of perception is well taken.²⁷

21. See generally R. F. MOULD, *CHERNOBYL RECORD: THE DEFINITIVE HISTORY OF THE CHERNOBYL CATASTROPHE* (2000); J. SAMUEL WALKER, *THREE MILE ISLAND: A NUCLEAR CRISIS IN HISTORICAL PERSPECTIVE* (2004). Both accidents could have been far worse. Three Mile Island was a contained accident; and while Chernobyl is still the worst nuclear accident in history, it could have been far worse if it had contaminated Kiev, a city of several million residents.

22. For example, the 2001 power failures in California caused a productivity loss of \$21.8 billion, a private party income loss of \$4.5 billion, and 135,000 jobs; and the power failure that blacked out the northeast United States on August 14, 2003 caused a \$75–\$100 million loss from food spoilage alone. BRAUNER, *RISK LANDSCAPE*, *supra* note 4, at 15.

23. RICHARD A. POSNER, *CATASTROPHE: RISK AND RESPONSE* 6 (2004).

24. *Id.* at 21–91.

25. *Id.* at 30–43, 106–09.

26. Posner discusses the impact of science fiction on our understanding of catastrophes and ultimately concludes “science fiction probably impedes rather than advances the recognition of the catastrophic risks that endanger us.” *Id.* at 100–10.

27. This said, I disagree with Posner’s proposition that extremely minute risks of apocalyptic catastrophes can somehow be quantified for the purposes of the ubiquitous cost-benefit analysis. Posner justifies expenditures to address enormously low frequency, extremely high severity risks through cost-benefit analysis. To calculate the “expected value” of the loss of

Although warnings about the potential end of civilization are provocative, I am more sanguine about our prospects. Perhaps my seemingly blithe disregard of minute frequency risks reflects the flaws of human perception that concern Posner, that is, the “the inability of many, maybe most, people, much of the time, to respond rationally to very-low-probability risks,”²⁸ but beyond identification of risk is prioritization of resource allocation. If mega-catastrophes are, by definition, infrequent events, apocalyptic risks are minute ones.²⁹ Certain risks are more likely, relatively speaking; there is greater confidence in the assessment of probability and so they are less speculative; and mitigation efforts are identifiable and practicable. For example, the introduction of nanotechnology into the stream of society, fantastic in concept only a few years ago, offers great promise in the near future.³⁰ But the risk is also immediate, perhaps unlikely, but less abstract. Here, the cost of mitigation may simply be the cost of regulation, a familiar burden carried by industry.

On the other hand, certain risks are so remote that their assessment is speculative and mitigation is impractical. Consider the risk of an asteroid strike. The probability of a global killer striking the earth has been cited as once every five hundred thousand to a million years.³¹ Assuming this to be true, should it be a policy priority to focus on such a risk? While the threat is real in the sense of possibilities, the minute frequency suggests that society has time to develop a response. Risks must be prioritized in terms of remediation efforts lest the notion of risk consume all societal endeavors.

human civilization, he first assumes the value of each human life at \$50,000 and from there estimates the value of human civilization at \$600 trillion. *Id.* at 167–70. The speculation continues with the assignment of probability values of highly infrequent events, which are plucked “out of the air” and made on “arbitrary” and “wild guess” assumptions. *Id.* at 140–41, 143. To his credit, he notes that while this economic methodology is “defensible,” there is “an urgent need for further research” on the proper values. *Id.* at 171. While intellectually provocative, this strained exercise exposes the problem of calculating the incommensurable. Even if the speculative variables are assumed for argument sake to have a rational basis, the calculation suggests that the value of human civilization has a market multiple of fifteen times the capitalization of the global financial markets. *See* New York Stock Exchange, <http://www.nyse.com> (last visited Mar. 6, 2006) (as of December 31, 2004, the capitalization of the global financial market was \$37.3 trillion; Posner published his book in 2004, making the end-of-year 2004 figure the appropriate “market” comparable). If business holdings are stripped out, much of which is held by only a minority of the global population, it would seem that the remainder of the human species enjoy a paltry premium to the corporate species. As is evident, such analysis is an economic conundrum, wrapped in a philosophical enigma.

28. POSNER, *supra* note 23, at 168.

29. For example, Posner reports on a physicist’s speculation that the probability of a strangelet accident is one in a billion. *Id.* at 30.

30. *See* Mark A. Lemley, *Patenting Nanotechnology*, 58 STAN. L. REV. 601 (2005).

31. POSNER, *supra* note 23, at 25.

Among other things, the appropriate time and manner of remediation are relative to the assessment of the threat and the costs. The question is not whether we should ignore the risk because it is so infrequent. It is whether the risk should be addressed now as opposed to the future when, for example, assessment techniques could be better or the relative cost of technology will be cheaper.³² Thus, public policy must focus on assessment and prioritization of risk and response.

All risks are not the same. The combinations of source, frequency, severity, manageability, predictability, and dependent variables are as unique as fingerprints. Past experiences have ranged in scale from localized events to mega-catastrophes. Risks must not only be identified, they must be assessed for the purpose of prioritization. As Posner suggests, “[u]tterly trivial probabilities of even large harms must be ignored, or we shall be devoting all our resources to harm avoidance.”³³ When a risk is so infrequent as to make the extrapolation of any data inadequate, its assessment becomes difficult. Assessment is shaped by empirical data (if available) *and* judgment (particularly where data is insufficient).³⁴

32. Technology jumps in quantum leaps, its growth is nonlinear, and today’s innovation is tomorrow’s commodity. We see this concept affect everyday economics of consumer choice: Should I buy that plasma television set now or wait five years when it may sell closer to the price of an ordinary set? Or consider that the first manned flight was in 1903, lasting 12 seconds and 120 feet, *The Greatest Adventures of All Time—The Fliers*, TIME, available at <http://www.time.com/time/2003/adventures/awrightbrothers.html> (last visited Mar. 30, 2006), and now in a little more than one hundred years we are considering the regulation of space tourism. *Space Tourism Regulations Are Proposed by the FAA*, WALL ST. J., Jan. 3, 2006, at D7. In the not too distant future, the relative technology cost and feasibility of detecting and avoiding an asteroid strike will be significantly lower than the cost to implement such a system now. While continued research in this area may be fruitful, it may be improvident to engage in an extraordinary effort to mitigate a minute risk when the progress of future technology will certainly reduce the real cost of such an endeavor in the not too distant future.

33. POSNER, *supra* note 23, at 141.

34. The concept of probability is often misunderstood. Probability is commonly understood as a number between 0 and 1, implicitly referring to a concept of statistical probability, i.e., the limiting value of relative frequency. See RICHARD VON MISES, *PROBABILITY, STATISTICS AND TRUTH* 14–20 (Hilda Geiringer ed., George Allen & Unwin Ltd., 2d rev. Eng. ed. 1957) (1928). But as John Maynard Keynes noted, statistical probability is limited in its concept, and only applies when sufficient data exists to provide a limiting value, and the underlying premise can be narrowly and symmetrically defined. JOHN MAYNARD KEYNES, *A TREATISE ON PROBABILITY* 34, 85 (Dover Publications 2004) (1921). Examples are the frequency of a particular dye roll or the particular sex of newborns. But in many cases, such data or premises cannot be discerned, as in the case of assessing individual lawsuits or unique events or highly infrequent events that would make statistical values meaningless. In these cases, there can be a probabilistic assessment, but probability is “subjective” and determined inductively as “the degree of our rational belief.” *Id.* at 34; see also M. G. BULMER, *PRINCIPLES OF STATISTICS* 5 (Dover Publications 1979) (1965) (inductive probability is “the degree of belief which it is rational to place in a hypothesis or proposition on given evidence”).

Perceptions of risk play a vital role.³⁵ Faulty perceptions have led to failed assessments, and such failures have plagued many endeavors.³⁶

September 11 is now the classic example of a spectacular failure by both the government and the private market. Both the national security apparatus and insurers extrapolated past data to perceive terrorism as discrete, low intensity violence.³⁷ Arguably, the first indication that terrorism can be a serious economic threat occurred on April 21, 1992, when the Irish Republican Army bombed London and caused \$671 million in insurance losses.³⁸ Since then, governments and insurance companies knew that terrorism could beget catastrophic losses. In the following year, Swiss Re warned that terrorism was a “catastrophic risk” and that a single act “can kill thousands of people [and] cause several billion dollars of damage.”³⁹ In 1999, the U.S. Commission on National Security, chaired by former Senators Warren Rudman and Gary Hart, warned that “Americans will likely die on American soil, possibly in large numbers.”⁴⁰ Despite these warnings, past experience could not be fully separated from future possibilities. The possibility of an attack beyond the perceived range of catastrophic experience could not be imagined, a flaw in the perception of risk: “individuals are strongly conditioned by their immediate past and limit their extrapolation to simplified constructs, seeing the future as a mirror of

35. See PAUL SLOVIC, *THE PERCEPTION OF RISK* 14 (2000).

36. The Space Shuttle Challenger accident in 1986 is a prime example. Before the disaster, NASA estimated a catastrophic failure rate between 1/100 and 1/100,000. Report of the Presidential Comm’n on the Space Shuttle Challenger Accident, app. F, at 2 (containing Richard Feynman’s Personal Observations on Reliability of Shuttle) (Feb. 3, 1986). According to the Nobel laureate Richard Feynman, one of the principle causes of the disaster was NASA’s failure to understand the limitations of a statistical theory of probability. While NASA relied on a high degree of mission success, it ignored previous instances of difficulties and near accidents. *Id.* “It is true that if the probability of failure was as low as 1 in 100,000 it would take an inordinate number of tests to determine it (you would get nothing but a string of perfect flights from which no precise figure, other than that the probability is likely less than the number of such flights in the string so far).” *Id.* Due to the problems of quantification of risk and statistical analysis, Feynman hinted that there should be a greater appreciation of “engineering judgment” in assessing safety, though such judgments cannot be quantified. *Id.*

37. See THE 9/11 COMMISSION REPORT: FINAL REPORT OF THE NATIONAL COMMISSION ON TERRORIST ATTACKS UPON THE UNITED STATES 343 (2004) (noting that certain members of the intelligence community believed that “[i]t would be a mistake to redefine counterterrorism as a task of dealing with ‘catastrophic,’ ‘grand,’ or ‘super’ terrorism”); Rhee, *supra* note 1, at 444 (“In effect, the risk was perceived to be so de minimis that it was covered for ‘free.’”).

38. Rhee, *supra* note 1, at 445.

39. *Id.* (quoting SWISS RE, *TERRORISM AND INSURANCE* 3 (1993)).

40. *Id.* at 445 n.43 (quoting THE U.S. COMM. ON NAT’L SEC., 21ST CENTURY NAT’L SEC. STUDY GROUP, *NEW WORLD COMING: AMERICAN SECURITY IN THE 21ST CENTURY* 4 (1999), available at <http://www.fas.org/man/docs/nwc/nwc.htm> (last visited Mar. 6, 2006)).

that past.”⁴¹ As in the case of flooding in New Orleans, an intellectual understanding of the risk was disassociated with a myopic belief that it cannot happen in the near future absent the confirmation of experience. Thus, bounded rationality colors our perception of risk and prioritization.

Given the above considerations, what risks should take priority? The most dangerous risks are the obvious ones. The greatest danger of catastrophe continues to be war. This is not meant to be a statement on current events (i.e., the “war on terror”), but simply a reflection of the fact that the most frequently recurring manmade catastrophe has been “democide” and war, which collectively killed over two hundred million people in the twentieth century.⁴² In this vein, mega-catastrophic terrorism is simply a mutation of war. Also, the potential of certain manmade accidents, particularly nuclear and other technological mishaps of the massive kind, cannot be discounted. These important exceptions aside, natural catastrophes pose the gravest dangers to society and its economic order. This point has been confirmed by three catastrophic events of the past year.

On December 26, 2004, a magnitude 9.0 undersea earthquake near the coast of Sumatra, Indonesia, triggered the South Asia tsunami, killing over 280,000 people.⁴³ This event reminds us that mega-catastrophes are fortuitous, random events striking any place, any time. The nations in the region, though prone to suffer earthquakes and tsunamis, had no warning

41. See Paul Slovic, Howard Kunreuther & Gilbert F. White, *Decision Processes, Rationality and Adjustment to Natural Hazards*, in SLOVIC, *supra* note 35, at 14 (quoting R.W. Kates, *Hazard and Choice Perception in Flood Plain Management*, Research Paper No. 78 at 88 (U. of Chicago, Dept. of Geology, 1962)) (internal quotation marks omitted); see also POSNER, *supra* note 23, at 136 (noting that humans have a difficult time comprehending extremely low frequency events because we lack current or historical experience).

42. “Democide” is defined as the murder of any person by government. R. J. RUMMEL, *DEATH BY GOVERNMENT* 15 tbl.1.6 (1994) (chronicling 169 million deaths from democide in the twentieth century); R. J. RUMMEL, *THE MIRACLE THAT IS FREEDOM: THE SOLUTION TO WAR, VIOLENCE, GENOCIDE, AND POVERTY* 3 (1995) (reporting that 33 million combatants died in wars in the twentieth century). The philosopher Thomas Hobbes famously posited that the state of nature was a perpetual cycle of war among people and that the state of war will result in “continual fear and danger of violent death, and the life of man, solitary, poor, nasty, brutish, and short.” THOMAS HOBBS, *LEVIATHAN* 76 (Edwin Curley ed., 1994) (1668). *But see* sources cited *supra* note 7 (discussing some political scientists’ beliefs that war as an idea is becoming disfavored).

43. Rhee, *supra* note 1, at 532 n.450. The technical details of the earthquake are available from the U.S. Geological Survey. See U.S. Geological Survey, Earthquake Hazards Program, <http://earthquake.usgs.gov/eqcenter> (last visited Mar. 11, 2006). The triggering undersea earthquake was so large that, according to NASA calculations, it minutely affected the earth’s rotation and the length of a day. See Gretchen Cook-Anderson & Dolores Beasley, *NASA Details Earthquake Effects on the Earth*, Jan. 10, 2005, available at http://www.nasa.gov/home/hqnews/2005/jan/HQ_05011_earthquake.html.

system, and so the catastrophe was magnified by a failure of the political economy of the region.⁴⁴ The market value of losses paled in comparison to the epic nature of the human tragedy.⁴⁵ Even the economic loss as measured by market value is deceptive. The afflicted regions were underdeveloped, and shallow penetration of insurance, indicative of less developed economies, makes the losses especially harsh as homes, resorts, factories, ships and infrastructure will be made more difficult to rebuild.⁴⁶ Thus, the ruinous wake of the tsunami will linger long after the sea reclaimed its waters and the final death toll is tallied.

On January 27, 2005, researchers confirmed the first cases of person-to-person transmission of the H5N1 avian flu virus.⁴⁷ Before, only bird-to-human transmissions were confirmed.⁴⁸ “The person-to-person transmission of one of the most lethal human pathogens in the modern world should serve as a reminder of the urgent need to prepare for a future influenza pandemic.”⁴⁹ Human contagion is the first of two conditions necessary for a pandemic, the second being a virus mutation that facilitates easy

44. The geographic area where the tsunami hit is a part region prone to earthquakes and tsunamis. See U.S. GEOLOGICAL SURVEY, RING OF FIRE, <http://pubs.usgs.gov/publications/text/fire.html> (last visited Feb. 19, 2006). But the victim nations failed to invest in an early warning system, presumably because of a lack of economic resources, an inability to work together without freeriding, or worse a horrible cost-benefit analysis. In the United States, the Pacific Tsunami and West Coast/Alaska Warning Centers provide a warning screen for Hawaii, Alaska, and the West Coast. See Nat'l Weather Serv., Pacific Tsunami Warning Center, <http://www.prh.noaa.gov/ptwc> (last visited Mar. 11, 2006); Nat'l Weather Serv., West Coast & Alaska Tsunami Warning Center, <http://wcatwc.arh.noaa.gov> (last visited Mar. 11, 2006).

45. See Rhee, *supra* note 1, at 467 & n.162 (citing Munich Re estimate of \$10 billion in economic losses). Had the event occurred in a developed area like Tokyo or Los Angeles, the economic devastation would have dwarfed that of 9/11. See *id.* at 454, 467.

46. See CHRISTIAN BRAUNER, SWISS RE, TSUNAMI IN SOUTH ASIA: BUILDING FINANCIAL PROTECTION 7 (2005) [hereinafter BRAUNER, TSUNAMI IN SOUTH ASIA] (“However, due to the very low insurance density, the insured losses will be relatively low compared to the overall scale of the losses suffered.”).

47. See generally Kumnuan Ungchusak et al., *Probable Person-to-Person Transmission of Avian Influenza A (H5N1)*, 352 NEW ENG. J. MED. 333 (2005).

48. The transmissions were confirmed in Hong Kong, where six of eighteen patients died. See WORLD HEALTH ORG., H5N1 AVIAN INFLUENZA: TIMELINE 1 (Oct. 28, 2005), available at http://www.who.int/csr/disease/avian_influenza/Timeline_28_10a.pdf. Based on current numbers, the mortality rate is over fifty percent. As of March 10, 2006, the World Health Organization counted 176 cases of avian flu in humans since December 2003, of which 97 patients died. World Health Org., Confirmed Cases of Avian Influenza A(H5N1), http://www.who.int/csr/disease/avian_influenza/country/en/index.html (last visited Mar. 1, 2006).

49. Ungchusak, *supra* note 47, at 340. Society still lives with the specter of the 1918 Spanish flu pandemic, which killed about 50 million people at a time when the global population was 1.8 billion. See JOHN M. BARRY, THE GREAT INFLUENZA: THE EPIC STORY OF THE DEADLIEST PLAGUE IN HISTORY 396–97 (2004).

transmission. Given these conditions, fluid labor markets, free trade, commoditized travel, democratization, and open borders make the perfect medium for a pandemic.⁵⁰ Thus, globalization is a two-faced Jekyll and Hyde. Although the avian flu is not yet a pandemic, human-to-human transmission is the realization of a catastrophic condition, foretelling the eventuality of a pandemic irrespective of whether this virus is the pathogen.⁵¹

On August 29, 2005, Hurricane Katrina, a category 3 hurricane, struck the Gulf Coast states.⁵² Its winds and storm surges breached the system of levees protecting New Orleans. The hurricane flooded eighty percent of the city, killed over 1300 people, and displaced the entire population of a major American city;⁵³ insurance losses alone are preliminarily estimated at \$34.4 billion, making it the costliest American catastrophe;⁵⁴ and the adverse economic consequences are substantial.⁵⁵ These losses are shocking, but the deeper tragedy is that they were predicted. In 2000, Ted Steinberg wrote:

A dreaded direct hit by a storm of comparable magnitude [a category 4 hurricane] would likely turn New Orleans into a huge lake 20 feet deep, with mass death a very real possibility. The

50. The 1918 flu pandemic likely originated in Haskell County, Kansas. See BARRY, *supra* note 49, at 98. From this remote part of rural America, the virus spread around the world within a year due in part to the transportation of millions of soldiers during World War I. *Id.*

51. The World Health Organization, the National Academy of Sciences (through its medical arm, the Institute of Medicine), and the U.S. Centers for Disease Control and Prevention all agree that influenza pandemics are virtually certain to recur. See *id.* at 450. In a disturbing development, cases of avian flu have migrated from Asia to Turkey, where as of January 10, 2006, there have been fifteen confirmed cases. See WORLD HEALTH ORGANIZATION, AVIAN INFLUENZA – SITUATION IN TURKEY – UPDATE 3 (Jan. 10, 2006), http://www.who.int/csr/don/2006_01_10a/en/index.html.

52. Katrina was initially thought to be a category 4 hurricane when it made landfall. See *Katrina Was Weaker Than First Thought: Despite Widespread Destruction, Storm Was Only a Category 3, Study Shows*, MSNBC.COM, Dec. 21, 2005, <http://www.msnbc.msn.com/id/10558235> [hereinafter *Katrina Was Weaker*]. Hurricanes are rated from 1 to 5 on the Saffir-Simpson Hurricane Scale. See Nat'l Hurricane Ctr., The Saffir-Simpson Hurricane Scale, <http://www.nhc.noaa.gov/aboutsshs.shtml> (last visited Mar. 11, 2006). Wind speed is the determining factor: category 1, winds 74–95 mph; category 2, winds 96–110 mph; category 3, winds 111–130 mph; category 4, winds 131–155 mph; category 5, winds greater than 155 mph. *Id.*

53. *Katrina Was Weaker*, *supra* note 52.

54. ISO Press Release, *supra* note 8.

55. See Press Release, Risk Management Solutions, RMS Combines Real-time Reconnaissance with Risk Models to Estimate Katrina Losses (Sept. 19, 2005), available at http://www.rms.com/newspress/PR_091905_HuKatrina_lossmethodology.asp (“RMS expects private-sector insured losses from Hurricane Katrina to reach \$40–\$60 billion. Total economic losses are expected to exceed \$125 billion.”); Jad Mouawad, *Katrina’s Shock to the System*, N.Y. TIMES, Sept. 4, 2005, at 31 (discussing the sharp spike in oil prices due to Hurricane Katrina).

moral of the story is clear: Think twice before assuming that high death tolls are a thing of the past.⁵⁶

Given that the levees were only designed to combat a category 3 hurricane,⁵⁷ and given that the area has experienced storms more powerful than this,⁵⁸ the catastrophe in New Orleans was simply a matter of time.

These recent events—the South Asia tsunami, the avian flu, and Katrina—show the potential exogenous shock to a society. Their rapid succession over the past year is symptomatic of the recent trend of increasing severity and frequency of catastrophes.⁵⁹ At the turn of the twenty-first century, we have already seen a number of highly infrequent events. First was 9/11, which in the context of the twentieth century was a 1/100 year event.⁶⁰ Katrina was another centennial event, the closest comparable being the 1906 San Francisco earthquake and fire.⁶¹ An avian flu pandemic could rival or exceed the 1918 Spanish flu pandemic. And the South Asia tsunami is one of the deadliest natural catastrophes in recorded history.⁶² The increasing frequency and severity of natural catastrophes pose

56. TED STEINBERG, ACTS OF GOD: THE UNNATURAL HISTORY OF NATURAL DISASTER IN AMERICA 75 (2000).

57. See *infra* note 77.

58. Killer hurricanes have long hit the Florida and Gulf Coast regions. In 1900, a category 4 hurricane hit Galveston, Texas, and killed between 8000 and 10,000 people, making it the worst natural catastrophe in the twentieth century in the U.S. See STEINBERG, *supra* note 56, at 70.

59. See BRAUNER, RISK LANDSCAPE, *supra* note 4, at 13 (charting the historic increase in manmade and natural catastrophes). Before 9/11 and Katrina, the only comparable event to Hurricane Andrew in terms of insurance losses was the 1906 San Francisco earthquake. Rhee, *supra* note 1, at 443 n.32. But in little more than a decade Andrew has taken a backseat to both 9/11 and Katrina. A pandemic of the avian flu has the potential to cripple the life insurance industry, and it was only a matter of chance that the South Asia tsunami did not hit an economically richer region of the world. These “hits” and “near misses” are consistent with the pattern of increased destruction from natural catastrophes, a pattern that dates back to the mid-1980s.

60. Rhee, *supra* note 1, at 468.

61. See PHILIP L. FRADKIN, THE GREAT EARTHQUAKE AND FIRESTORMS OF 1906, at xi–xvi (paperback ed. 2005) (discussing many similarities between Hurricane Katrina and the 1906 San Francisco earthquake and fire). The death toll was approximately 3000 to 5000. *Id.* at 191. The earthquake measured 7.7 to 7.9 on the Richter scale and caused \$180 million in losses, constituting 35% of the U.S. primary insurance premiums at the time. PATRIZIA BAUR & RUDOLPH ENZ, SWISS RE, SIGMA NO. 5/2003, REINSURANCE—A SYSTEMIC RISK? 13 (Thomas Hess & Auriella Zanetti eds., 2003).

62. Tragically, natural catastrophes of such epic scale are not so infrequent, at least in underdeveloped regions of the world. Catastrophes that kill tens and hundreds of thousands of victims occur from time to time, infrequent in terms of years but expected in terms of decades. Since 1970, the ten most deadly natural catastrophes have all taken place in underdeveloped countries, and several of these have killed over one hundred thousand victims. See Rhee, *supra* note 1, at 532 tbl.4. These regions are not necessarily more prone to natural catastrophes.

the most immediate, tangible risk, and they portend a new era of mega-catastrophes.

II. CATASTROPHE AND CHOICE

It is plausible that the cluster of extreme events mentioned above is random. To see patterns in randomness where there are none is a common phenomenon. But if we accept that catastrophe's causality and consequence are not independent of human influence, the recent events could portend a trend towards greater magnitude events and evince society's increasing susceptibility to mega-catastrophes. The common perception is that natural catastrophes are a matter of random fate, something beyond our control. When disaster strikes, "the emphasis has been on making nature the villain."⁶³ This convention conforms to preconceived notions of disasters (thus "an act of God") and provides a convenient explanation to deflect attention away from the human choices that may have contributed to the loss.⁶⁴ Of course the causes of certain natural events like earthquakes or tsunamis are independent. But it is a mistake to believe that causality and consequence are always divorced from human influence and policy choices.

In terms of *causality*, climate change is the primary concern. The phenomenon of global warming is an accepted scientific fact.⁶⁵ The theory is that warming results from the accumulation of greenhouse gases.⁶⁶ Evidence supports the theory that human-induced global warming is a contributing cause of severe weather patterns experienced in recent years.⁶⁷

Rather, the consequences of natural disasters are amplified by the political economy of the region, as seen in the lack of an early warning system in the South Asia tsunami, low standards of building construction and other preventative measures, and perhaps overpopulation in catastrophe prone areas. Major disasters in the United States rarely see a death toll in excess of several hundred.

63. STEINBERG, *supra* note 56, at xxiii.

64. Steinberg notes that the randomness of natural catastrophes has served as a convenient object of blame deflecting potential criticism of individual choices and government action that contributed to the scale of the consequences. *Id.* at 47–68, 79–96.

65. See generally Sydney Levitus et al., *Warming of the World Ocean*, 287 SCIENCE 2225 (Mar. 24, 2000) (noting the warming of the world's oceans to a depth of two miles in five decades).

66. THE INT'L CLIMATE CHANGE TASKFORCE, MEETING THE CLIMATE CHALLENGE: RECOMMENDATIONS OF THE INTERNATIONAL CLIMATE CHANGE TASKFORCE 1 (Jan. 2005) [hereinafter CLIMATE CHALLENGE]; HARVARD MEDICAL SCHOOL, THE CENTER FOR HEALTH AND THE GLOBAL ENVIRONMENT, CLIMATE CHANGE FUTURES: HEALTH, ECOLOGICAL AND ECONOMIC DIMENSIONS 4 (Paul R. Epstein & Evan Mills eds., Nov. 2005) [hereinafter CLIMATE CHANGE FUTURES].

67. CLIMATE CHANGE FUTURES, *supra* note 66, at 4. See Tim P. Barnett et al., *Penetration of Human-Induced Warming into the World's Oceans*, 309 SCIENCE 284 (July 2005); Richard A.

This belief in the scientific community is gaining support, and no critical mass of scientific literature has emerged to show that human activity is not a significant cause of global warming or that global warming is not a significant cause of severe weather patterns.⁶⁸ There is at least a well-documented correlation between global warming and increased severe weather patterns in the past several decades.⁶⁹

The International Climate Change Taskforce announced in a recent policy statement: “Climate change represents one of the most serious and far-reaching challenges facing humankind in the twenty-first Century.”⁷⁰ While the debate in the scientific community continues,⁷¹ the private market, the best assessor of risk ever devised by man, is behaving consistently with the emerging scientific belief. The concern is based on experience. Insurance losses have seen dramatic increases in catastrophe related losses since the late 1980s.⁷² Prompted by these losses and business necessity, the insurance industry has accepted the link between global warming and severe weather patterns, and it is innovating financial products and insurance solutions to manage the risk and profit from it.⁷³ Insurance is not the only aspect of business that has been affected. Severe weather profoundly changes the competitive landscape of business and affects, among other things, supply, demand, price, financial planning, logistics and energy sourcing. Like the insurance market, the private sector appears to be accepting the idea that global warming could impact profits. Slow adaptation is already evident. The private sector is making substantial investments, innovations and policy decisions to address global warming and to profit from it.⁷⁴

Kerr, *Is Katrina a Harbinger of Still More Powerful Hurricanes?*, 309 SCIENCE 1807 (Sept. 2005); Kevin Trenberth, *Uncertainty in Hurricanes and Global Warming*, 308 SCIENCE 1753 (June 2005).

68. While “there is no sound theoretical basis for drawing any conclusions about how anthropogenic climate change affects hurricane numbers . . . trends associated with human influences are evident in the environment in which hurricanes form, and our physical understanding suggests that the intensity of and rainfalls from hurricanes are probably increasing.” Trenberth, *supra* note 67, at 1754.

69. See *supra* note 66.

70. CLIMATE CHALLENGE, *supra* note 66, at 1.

71. See Valerie Bauerlein, *Hurricane Debate Shatters Civility of Weather Science*, WALL ST. J., Feb. 2, 2006, at A1.

72. See Rhee, *supra* note 1, at 500 & n.314 (noting increased insurance losses); ZANETTI ET AL., *supra* note 8, at 5 (same); see also Evan Mills, *Insurance in a Climate of Change*, 309 SCIENCE 1040 (Aug. 2005) (discussing insurance issues in an era of climate change). The losses are also attributable to increased property values and population of high risk areas. *Id.* at 1042.

73. See Rhee, *supra* note 1, at 500–05 (discussing natural catastrophe securitizations).

74. See, e.g., Jeffrey Ball, *Deep in the Sahara, BP Tries to Put Dent in Global Warming*, WALL ST. J., Feb. 4, 2005, at A1 (discussing the oil industry and global warming); Abraham

In terms of *consequences* of natural catastrophes, they are often made worse by human choices. This is the central theme in Steinberg's *Acts of God: The Unnatural History of Natural Disaster in America*: "In truth, however, natural calamities frequently do not just happen; they are produced through a chain of human choices and natural occurrences, and in this sense they form a legitimate topic for social and historical study."⁷⁵ The destruction of New Orleans was as much a manmade disaster as it was a natural one. The seeds of disaster were sown many years ago. Realizing that the greatest natural threat to New Orleans is a hurricane induced storm surge, Congress authorized the construction of the levee system in 1965.⁷⁶ The system was designed to combat a storm roughly equivalent to a fast-moving category 3 hurricane, a storm thought to strike coastal Louisiana once every 200 years.⁷⁷ This probability is based on obsolete data and of course does not incorporate factors such as global warming. Since the mid-1980s, catastrophic losses, much of which were tropical storm driven, have increased significantly.⁷⁸ In 1992 Hurricane Andrew, a category 5 hurricane, devastated the Florida coast and at the time inflicted the most severe single event insurance loss in the modern era.⁷⁹ In 2004, a series of four hurricanes hit the American southeast and Florida in a matter of several weeks, collectively causing more insurance losses than Andrew.⁸⁰ In 2005, a record three hurricanes, including Katrina, reached category 5 status.⁸¹ Since the

Lustgarten, *Getting Ahead of the Weather: How Companies are Protecting Themselves Against the Effects of Extreme Events and Long-Term Changes*, FORTUNE, Feb. 7, 2005, at 87 (discussing the use of financial futures to offset weather related disruptions to business operations). British Petroleum has made environment concerns a part of its marketing strategy. See, e.g., BP Global, <http://www.bp.com> (last visited Mar. 7, 2006) (corporate website having a section on "Environment and Society"). Even investment banking firms, which seemingly would not be affected by global warming as their chief product is the delivery of intellectual services, have realized that global warming may have dramatic consequences on the orderly working of the global markets in the long-term. See Claudia H. Deutsch, *Goldman to Encourage Solutions to Environmental Issues*, N.Y. TIMES, Nov. 22, 2005, at C3 (discussing how investment banks like Goldman Sachs and J.P. Morgan Chase have recognized global warming and adopted environment conscious policies).

75. STEINBERG, *supra* note 56, at xix.

76. Pub. L. No. 89-298, § 204, 79 Stat. 1073 (1965) (codified at 42 U.S.C. § 1962d-5).

77. U.S. GOV'T ACCOUNTABILITY OFFICE, GAO-06-322T, HURRICANE PROTECTION: STATUTORY AND REGULATORY FRAMEWORK FOR LEVEE MAINTENANCE AND EMERGENCY RESPONSE FOR THE LAKE PONTCHARTRAIN PROJECT 4 (2005) [hereinafter GAO, STATUTORY AND REGULATORY FRAMEWORK].

78. See sources cited *supra* note 72.

79. Rhee, *supra* note 1, at 532 tbl.3.

80. *Id.* at 532 n.449 (Hurricanes Charley, Frances, Ivan and Jeanne).

81. See *The 2005 Season is Finally Over!*, WEATHER.COM, Feb 27, 2006, http://www.weather.com/newscenter/tropical/?from=wxcenter_news (describing hurricanes Katrina, Rita, and Wilma) (last visited Apr. 1, 2006).

1970s the frequency of category 4 and 5 hurricanes and the destructiveness of tropical storms have doubled.⁸²

The experience since 1965 suggests that the original probability assumption was wrong. Of course this is hindsight bias. The point is not that the original assumption was wrong (who can predict weather patterns 30 or 40 years into the future?), but that no allowance was made for the possibility of error. There was no “cushion” built into the engineering standard. The 1/200 year assessment, which simply means that in any given year the city had a 0.5% chance of a catastrophic breach, *was* the safety margin. In short, the decision to set the engineering standard at a 1/200 year event was shortsighted.⁸³ A severe hurricane striking the Gulf region was a distinct possibility, if not a probability. In recent years the government realized the possibility of a category 4 or 5 hurricane striking the region.⁸⁴ The only action taken, however, was to conduct a “pre-feasibility” study to gauge the cost and time required for a “full feasibility study” (this study ultimately concluded that a full study would cost \$8 million and take at least five years).⁸⁵ Thus a chain of decisions, dating back to 1965, contributed to the natural catastrophe. Since causality and consequences are intimately intertwined with human choice, it is an open question whether the flooding of New Orleans was caused by a natural event or a man-made condition. Like two fires that converge to burn a village, both factors substantially contributed to the mega-catastrophe.

Human influence on natural catastrophes is not limited to government action (or inaction). Population and wealth play a large part in determining the scope of a catastrophe. Population growth continues to be a source of systemic risk since Robert Malthus first studied the subject.⁸⁶ Since 1900, the world population has grown from 1.6 to 6.5 billion.⁸⁷ The world is also more peaceful, prosperous and wealthy as these matters have become a moral imperative.⁸⁸ Frequency and severity of catastrophes have increased

82. CLIMATE CHANGE FUTURES, *supra* note 66, at 4.

83. The Dutch built their system of dikes to withstand a one in 10,000 year event. John Schwartz, *Category 5: Levees Are Piece of a \$32 Billion Pie*, N.Y. TIMES, Nov. 29, 2005, at A1.

84. U.S. GOV'T ACCOUNTABILITY OFFICE, GAO-05-105OT, ARMY CORPS OF ENGINEERS, LAKE PONTCHARTRAIN AND VICINITY HURRICANE PROTECTION PROJECT 8 (2005).

85. *Id.*

86. THOMAS ROBERT MALTHUS, AN ESSAY ON THE PRINCIPLE OF POPULATION (Philip Appleman ed., Norton Critical ed. 1976) (1798). Although written in 1798, Malthus's theory of population growth still has relevance today. *See, e.g.*, POSNER, *supra* note 23, at 68–71 (discussing the effects of population growth on catastrophes).

87. Leonard David, *World Population Hits 6.5 Billion*, MSNBC.COM, Feb. 25, 2006, <http://www.msnbc.msn.com/id/11545564>; *see also* POSNER, *supra* note 23, at 68.

88. BENJAMIN M. FRIEDMAN, THE MORAL CONSEQUENCES OF ECONOMIC GROWTH 9–11 (2005). *See generally* MANDELBAUM, *supra* note 5.

because, among other things, more lives and value are at risk. Like Newton's law of motion, social progress and risk are opposite forces that exert pressure on each other. As human life and economic livelihood are valued more in a world that has grown more prosperous and peaceful,⁸⁹ we become more susceptible to greater catastrophes.⁹⁰

Socioeconomic and demographic trends influence the consequences of a disaster.⁹¹ Population and development in disaster prone areas is a matter of choice. It is no accident that real estate values are the highest in the coasts, and that the nation's current real estate boom has disproportionately increased values in certain desirable locations like Florida and California.⁹² The point is not to condemn people who chose to live along fault lines or coastlines for the disasters that befall them. In most situations, ripping out one's social and economic roots for the sole consideration of avoiding a catastrophic risk could be an irrational choice,⁹³ and it is impractical to believe that large cities like New Orleans can be lifted from their foundation and moved to higher ground.⁹⁴ But human choices impact the severity of the consequences. It is therefore appropriate to analyze the costs and incentives created through market forces or government action.

Catastrophes raise the issue of who will or should pay. The burden invariably falls on three candidates: the victim, the insurer (if any), the

89. In light of recent American military ventures in Iraq and Afghanistan, some may disagree with my assertion that the world is more peaceful. But a number of political scholars have noted that the idea of peace is becoming the accepted norm, though there are still many flashpoints of violence. *See generally supra* notes 5, 7 and accompanying text.

90. A repetition of the 1923 earthquake in modern Tokyo would cause losses up to seventy-five percent of the Japanese gross domestic product. BRAUNER, RISK LANDSCAPE, *supra* note 4, at 15 (OECD estimate). Regarding the South Asia tsunami, Swiss Re observed that increased development and population along coastlines "aggravate the potential scale of future events." BRAUNER, TSUNAMI IN SOUTH ASIA, *supra* note 46, at 6.

91. "As recognized by insurers and others, migration of populations to flood- and fire-prone areas, increasing reliance on vulnerable electric power grids, and rising material wealth are among the many drivers." Evan Mills, *Insurance in a Climate of Change*, 309 SCIENCE 1040, 1041 (2005).

92. *See* Les Christie, *Real Estate: Busts Don't Follow Booms*, CNN.COM, May 4, 2005, http://money.cnn.com/2005/05/03/real_estate/financing/boom_bust (noting substantial valuation gains in California and Florida); *Top Housing Markets: Fourth-Quarter Numbers are in. See How Your Town Stacks Up.*, CNN.COM, http://money.cnn.com/pf/features/lists/nar_4q (last visited Mar. 8, 2006) (listing many California and Florida regions having top valuation gains).

93. STEINBERG, *supra* note 56, at 98 ("For all the people who consciously chose to make the floodplain their home, many more were forced to do so. The latter were compelled to live there by economic exigencies, by the simple fact that cheap, flood-prone land can be a magnet for the poverty stricken, who are forced to live in the shadow of disaster.").

94. *Id.* at 119 ("While moving may be a realistic option for small communities, larger cities that owe their existence to elaborate water control structures are unlikely to find it appealing.").

government (taxpayers), or a combination thereof.⁹⁵ Without government action, private parties will rationally apportion risk and loss through insurance (given the limits of information). Policyholders and insurers tend to allocate risk efficiently in the long-term, meaning that the market accurately prices risk.⁹⁶ This is not to suggest that markets operate perfectly, as short-term price inefficiencies exist. Price and value may at times be misaligned. It is a paradox of the market that a certain degree of mispricing is a necessary condition to a liquid, efficient market.⁹⁷ For example, the pre-9/11 insurance market operated on an erroneous price paradigm, grossly underpricing terrorism risk.⁹⁸ But markets adjust and over time a new equilibrium is reached. This is seen in the market reactions to major catastrophes including Hurricane Andrew, the Northridge earthquake, and 9/11.⁹⁹ Once price and value are closely aligned, the allocation of risk places appropriate incentives on parties and “market discipline” is imposed on them. Moral hazards are reduced, and appropriate mitigation and avoidance measures are instituted.¹⁰⁰ When, however, government action through subsidized insurance or ex post subsidies is introduced, that discipline may give way to price distortions that incentivize inappropriate risk-taking.¹⁰¹

The government flood insurance program is a good example. Flooding is such a high risk that private insurers exclude coverage,¹⁰² leaving property

95. Charity is increasingly becoming a substantial factor. *See supra* note 9. *See generally* Joanne Linnerooth-Bayer, Reinhard Mechler & Georg Pflug, *Refocusing Disaster Aid*, 309 SCIENCE 1044 (2005) (discussing disaster aid).

96. *See Rhee, supra* note 1, at 492 (“The private market is more nimble, intelligent, and diligent than government in turning a profit and improving efficiency within a market.”).

97. *See Fischer Black, Noise*, 41 J. FIN. 529, 532 (1986) (“What’s needed for a liquid market causes prices to be less efficient.”). Black is the co-author, along with Myron Scholes, of the Black-Scholes option pricing model. Fischer Black & Myron Scholes, *The Pricing of Options and Corporate Liabilities*, 81 J. POL. ECON. 637 (1973). In 1997, Scholes won the Nobel Prize in Economics. Black’s death in 1995 made him ineligible to receive the award.

98. *See Rhee, supra* note 1, at 444 (“In effect, the risk was perceived to be so de minimis that it was covered for ‘free.’”). For example, before 9/11, Chicago’s O’Hare Airport had a \$750 million terrorism policy at an annual premium of \$125,000. Howard Kunreuther & Erwann Michel-Kerjan, *Challenges for Terrorism Risk Insurance in the United States*, 18 J. ECON. PERSP. 201, 203 (2004). After 9/11, the coverage was reduced to \$150 million at a premium of \$6.9 million. *Id.*

99. *See Rhee, supra* note 1, at 448–54 (discussing the effects of exogenous shock on pricing in the insurance industry).

100. *See id.* at 490 n.274 (noting the voluntary prophylactic measures taken by businesses against terrorism risk).

101. *See id.* at 485–96 (discussing the effects of subsidized insurance on private behavior).

102. U.S. GOV’T ACCOUNTABILITY OFFICE, GAO-06-119, FEDERAL EMERGENCY MANAGEMENT AGENCY: IMPROVEMENTS NEEDED TO ENHANCE OVERSIGHT AND MANAGEMENT OF THE NATIONAL FLOOD INSURANCE PROGRAM 1 (2005) [hereinafter GAO, IMPROVEMENTS

owners three choices: assume the risk, eliminate it by vacating or selling the property, or take mitigation measures. In 1968 Congress changed this dynamic by enacting the National Flood Insurance Act (NFIA).¹⁰³ It believed that a flood insurance program with “large-scale participation of the Federal Government and carried out to the maximum extent practicable by the private insurance industry is feasible and can be initiated.”¹⁰⁴ In return for subsidized insurance, Congress required communities to pass laws and regulations on land use in floodplain areas.¹⁰⁵ The insurance aspect of the program is serviced by private insurers who are in turn managed by the Federal Emergency Management Agency (FEMA). Flood insurance has proven to be a well intentioned, ill-conceived, poorly executed idea.¹⁰⁶ The problem is multi-dimensional, but it starts with underwriting.

[T]he program, by design, is not actuarially sound because Congress authorized subsidized insurance rates to be made available for policies covering some properties to encourage communities to join the program. As a result, the program does not collect sufficient premium income to build reserves to meet the long-term future expected flood losses.¹⁰⁷

Policyholders pay premiums that represent about thirty-five to forty percent of the true actuarial risk.¹⁰⁸ As a result, the program is not independently sustainable because it was designed to be a loss-making endeavor.¹⁰⁹ Nor is the final cost-benefit analysis encouraging. According to FEMA, the government saves \$1 in ex-post-disaster aid payments for every \$3 of flood insurance claims paid.¹¹⁰ Why sustain an expensive ex ante

NEEDED IN NFIP]. According to the Government Accountability Office, “[n]inety percent of all natural disasters in the United States involve flooding.” *Id.*

103. National Flood Insurance Act of 1968, Pub. L. No. 90-448, 82 Stat. 572 (codified as amended at 42 U.S.C. §§ 4001–4129 (2000)).

104. 42 U.S.C. § 4001(b) (2000).

105. *See* Fed. Emergency Mgmt. Agency, National Flood Insurance Program: Top 10 Things State Legislators Can Do, http://www.fema.gov/nfip/leg_10.shtml#C (last visited Mar. 1, 2006).

106. *See* Rhee, *supra* note 1, at 492–93 & nn.288–90.

107. U.S. GOV'T ACCOUNTABILITY OFFICE, GAO-06-174T, FEDERAL EMERGENCY MANAGEMENT AGENCY: CHALLENGES FACING THE NATIONAL FLOOD INSURANCE PROGRAM 5 (2005) [hereinafter GAO, CHALLENGES FACING THE NFIP].

108. *Id.* at 4.

109. *See id.* at 5 (“As of August 2005, the program had borrowed \$300 million to cover an estimated \$1.8 billion in claims from the major disasters of 2004, including hurricanes Charley, Frances, Ivan and Jean.”). After Hurricane Katrina, legislation was enacted to expand the borrowing capacity from \$1.5 billion to \$3.5 billion through fiscal year 2008 in anticipation of major losses from flood claims related to Hurricane Katrina. National Flood Insurance Program Enhanced Borrowing Authority Act of 2005, Pub. L. No. 109-65, 119 Stat. 1998 (2005).

110. GAO, CHALLENGES FACING THE NFIP, *supra* note 107, at 2.

insurance program when a cheaper ex post welfare distribution is available? The government would answer that flood plain management and mitigation efforts mandated by the NFIP save about \$1 billion in flood damage each year.¹¹¹ However, this figure is deceptive because it is unknown whether the losses would have occurred without the NFIP. Losses and flood insurance are codependent factors, and so some of the “savings” are illusory and should be better characterized as a cost.¹¹²

The problem is not limited to the NFIP. Government insurance programs have historically had adverse economic effects. They have “crowded out” the private sector with infeasible pricing, “anesthetized” market innovations, and created moral hazards.¹¹³ These effects are also seen in terrorism insurance. After 9/11, the government enacted the Terrorism Risk Insurance Act of 2002 (“TRIA”),¹¹⁴ an ex ante federal backstop for catastrophic losses.¹¹⁵ TRIA was enacted as a temporary price stabilization measure, allowing “a transitional period for the private markets to stabilize, resume pricing of such insurance, and build capacity to absorb any future losses.”¹¹⁶ The program had a sunset date of December 31, 2005.¹¹⁷ In my earlier article, I noted that government insurance would extinguish the private market’s incentive to innovate and that “[m]arket anesthetization is already evident in the failure to develop a private market solution (the second of TRIA’s goals) and the industry’s lobbying efforts to extend TRIA.”¹¹⁸ The concern was corporate entitlement capture. Recently, this prediction came true as intense lobbying by the insurance and big businesses led to the extension of TRIA for another two years,¹¹⁹ proving that in the arena of government insurance “nothing is more permanent than the temporary.”¹²⁰

111. *Id.*

112. I am unaware of any study that decouples these factors to provide a true picture of the NFIP’s costs and savings. An independent study by an agency like the GAO, if even feasible, would be helpful.

113. Rhee, *supra* note 1, at 490–91. See generally Anne Gron & Alan O. Sykes, *Terrorism and Insurance Markets: A Role for the Government as Insurer?*, 36 IND. L. REV. 447 (2003); Saul Levmore & Kyle D. Logue, *Insuring Against Terrorism—and Crime*, 102 MICH. L. REV. 268 (2003).

114. Pub. L. No. 107-297, § 101(a)–(b), 116 Stat. 2322 (2002).

115. Rhee, *supra* note 1, at 454–59 (describing the provisions of the Terrorism Risk Insurance Act of 2002).

116. *Id.* at 456 (quoting Terrorism Risk Insurance Act of 2002 § 101(b)).

117. *Id.* at 455 n.93.

118. *Id.* at 491.

119. Terrorism Risk Insurance Extension Act of 2005, Pub. L. No. 109-144, 119 Stat. 2660 (2005).

120. Rhee, *supra* note 1, at 488 n.265 (quoting HOWARD KUNREUTHER & ERWANN MICHAEL-KERJAN, THE WHARTON SCHOOL OF THE UNIVERSITY OF PENNSYLVANIA, DEALING

Although the new extension increases the trigger amounts and deductibles, it has had little effect in reducing premiums from current levels.¹²¹ There is an explanation for this curious market reaction: insurers are well-capitalized even without a federal backstop and thus rates are unaffected by the extension. This suggests that the federal program may not have produced lower priced premiums. Insurance is a cyclical business, and the pricing of premiums is subject to the ebb and flow of the supply and demand of capital. The greater is the amount of capital held, the lower premiums will be. Because the insurance industry is well-capitalized and indeed holds more capital now than before 9/11, prices may have reached levels reasonably comparable to what market rates would have been without the federal program.¹²² In other words, insurance companies may have had to underwrite terrorism policies given the demand for them and the abundant capital. No doubt insurers would have insisted on tighter coverage limitations, but even these restrictions may have ultimately loosened under long-term price competition. By replacing insurance capital with government funds at the extreme range of potential liability, the private industry underwrites and manages extreme terrorism risk but the government bears a substantial portion of the loss, an arrangement that over the long term may closely resemble the national flood insurance program.

If the problems of government insurance boil down to a matter of welfare distribution, the issue is simply a policy question on the appropriate use of taxpayer funds. But by affecting incentives and creating moral hazards, government programs touch the issue of risk amplification. Consider again flood insurance. Although the mortality rate from natural catastrophes has been declining, deaths from floods have actually increased in the latter half of the twentieth century.¹²³ Katrina is consistent with this trend. The increased death toll coincides with substantial efforts by the government to manage flood risk, including the NFIP and the New Orleans levee construction project. I am not suggesting that there is direct causation, but certainly these programs are an influencing factor. Too often, “federal flood insurance encouraged people to rebuild where they were destined to meet ruin again and again, a fact borne out by . . . repetitive claims.”¹²⁴

WITH EXTREME EVENTS: NEW CHALLENGES FOR TERRORISM RISK COVERAGE IN THE U.S. 12 (2004)).

121. Liam Plevin, *Terrorism-Insurance Premiums Are Expected to Remain Steady*, WALL ST. J., Dec. 31, 2005, at A3.

122. Rhee, *supra* note 1, at 461. Because insurers are regulated and limited in their underwriting by the amount of capital, capital determines the amount of capacity (i.e., supply of insurance premiums) in the market. *Id.* at 462–64.

123. STEINBERG, *supra* note 56, at 73–74.

124. *Id.* at 97.

Because the poor have little economic choice in habitation, they bear the brunt of the costs associated with this destructive cycle.¹²⁵ Thus, the well-intended risk mitigation has not come to pass, and, quite the opposite, the program has incentivized the habitation and building in hazardous areas, putting more value at risk and raising the cost of ex post disaster assistance.

III. LIMITATIONS IN GOVERNANCE

Although the government is the first place people look to in times of crisis, government action is not a panacea. In fact, the opposite can be true. Government actions have been at the center of some of the greatest human catastrophes. On the extreme end of the scale is intentional misconduct like democide. On the other end of the scale is ineptitude, indifference, or negligence. While the degree of moral culpability here is not imbued with the bane of evil, the banality of bureaucracy can injure or kill equally. The question of legal liability is distinct from moral culpability, and culpability may be distinct from accountability.¹²⁶ Only the government has the centralized power to preempt others, to coerce action, to act in unison, and to marshal enormous resources; and yet due to incompetence, indifference or inertia, it has often failed in preventing or mitigating catastrophes. Government action then in times of crisis can be a poisoned tonic, the

125. *See id.* at 105 (stating that flood insurance has “subsidized the poor in a place where real estate capitalism had forced them to live—on the margins, in the cheapest, riskiest and most flood-prone land”).

126. Under American law, there is no criminal liability for errors arising from the discretionary decisions associated with the emergency management. In other parts of the world, such liability may attach to public officials. *See* Violaine Roussel, *New Moralities of Risk and Political Responsibility*, in *RISK AND MORALITY* 117–42 (Richard V. Ericson & Aaron Doyle eds., 2003) (noting a convergence of criminal and political responsibility in France). Moreover, it is settled tort doctrine that the government does not owe a general duty of care to the public at large. *See, e.g.,* *Wanzer v. District of Columbia*, 580 A.2d 127, 132 (D.C. 1990); *Riss v. City of New York*, 240 N.E.2d 860, 861 (N.Y. 1968); *cf.* Federal Tort Claims Act, 28 U.S.C. § 2680(a) (2000) (providing that the government retains immunity from suits “based upon the exercise or performance or the failure to exercise or perform a discretionary function or duty on the part of a federal agency or an employee of the Government, whether or not the discretion involved be abused”).

perceived remedy that can in fact be a harmful agent.¹²⁷ Thus, it is a source of systemic risk in the management of catastrophes.¹²⁸

In an increasingly complex world, where nongovernmental entities have increased in influence, the government no longer has top-down vertical control of its programs and services. The political scientist Donald Kettl calls this phenomenon “devolution.”¹²⁹

In doing their work, American governments at all levels became increasingly interconnected with private corporations and nongovernmental organizations (NGOs) that share in the task of delivering public services. Government policy thus became the product of how government managed its relationships with an increasingly devolved system.¹³⁰

Decisionmaking, execution, capability, and power have diffused. Even the business of wartime combat, a quintessentially sovereign function, has given way to a private-public partnership.¹³¹ Increased horizontal and vertical connectivity among government and nongovernmental entities makes the delivery of government services particularly difficult in times of crisis when speed, efficiency, and coordination mean the difference between life and death.

The consequence of devolution is seen in the response to Katrina. It is undisputed that “the system, at every level of government, was not well-coordinated, and was overwhelmed in the first few days.”¹³² Katrina is one of those rare events where the fault, if not admitted, is so obvious that the government has conceded a tacit *nolo contendere*.¹³³ The litany of mistakes

127. This paradox may be unique to the American experience and the theory of government where the deep rooted distrust of government power conflicts with the natural tendency of people to look to the government for relief in times of crisis. DONALD F. KETTL, *THE TRANSFORMATION OF GOVERNANCE: PUBLIC ADMINISTRATION FOR TWENTY-FIRST CENTURY AMERICA* 27–28 (2002).

128. See Rolf Nebel, *Regulations as a Source of System Risk: The Need for Economic Impact Analysis*, 29 GENEVA PAPERS ON RISK & INS. 273, 281–82 (2004).

129. KETTL, *supra* note 127, at 129.

130. *Id.* at 118.

131. See generally P.W. SINGER, *CORPORATE WARRIORS: THE RISE OF THE PRIVATIZED MILITARY INDUSTRY* (2003).

132. President George W. Bush, President Discusses Hurricane Relief in Address to the Nation (Sept. 15, 2005), available at <http://www.whitehouse.gov/news/releases/2005/09/20050915-8.html>.

133. *Id.*; U.S. HOUSE OF REPRESENTATIVES, *A FAILURE OF INITIATIVE: FINAL REPORT OF THE SELECT BIPARTISAN COMMITTEE TO INVESTIGATE THE PREPARATION FOR AND RESPONSE TO HURRICANE KATRINA I* (2006), available at <http://www.gpoaccess.gov/katrinareport/mainreport.pdf> (stating that Congress found “failures at all levels of government”) [hereinafter *A FAILURE OF INITIATIVE*]; Edward Alden, *Government’s Katrina Preparations “Were All Wrong”*, FIN. TIMES, Oct. 21, 2005 (quoting Presidential Advisor, Frances Townsend, “It turns

are well known—the failure to appreciate the magnitude of the impending disaster, to communicate to the public, to evacuate the area, to coordinate among governmental branches, to implement search and rescue, to provide supplies, to plan a post-disaster relief operation, to procure temporary housing facilities, etc.¹³⁴ In the coming months and years, historians will document the exact details of the systemic failure. It is easy to blame public officials in hindsight for their personal failings as they may personify the institutional failure,¹³⁵ but Katrina shows the complexity of crisis management. The power to evacuate, transport, communicate, authorize funding, mobilize the military, search and rescue, police, contract with private suppliers, manage delivery of supplies and services, etc., was diffused throughout the various branches of government and nongovernmental entities.

The inefficiency of government action is contrasted with private action.¹³⁶ Before the storm hit, private companies prepared days in advance.¹³⁷ Immediately after the storm, they resumed normal operations even in the most devastated areas within days.¹³⁸ Companies like Wal-Mart, FedEx and Microsoft were quick to provide charitable services in the

out we were all wrong, we had not adequately anticipated [the storm].”); *see also* Evan Thomas, *The Lost City: What Went Wrong*, NEWSWEEK, Sept. 12, 2005, at 42, available at <http://www.msnbc.msn.com/id/9179587/site/newsweek/page/2> (“How the system failed is a tangled story, but the basic narrative is becoming clearer: hesitancy, bureaucratic rivalries, failures of leadership from city hall to the White House and especially bad luck combined to create a morass.”). In this regard, it is ironic that the government has charged the owners of a nursing home with negligent homicide for the drowning deaths of thirty-four residents and the basis for this charge is the failure to evacuate the residents upon notice of an impending deadly storm. *See* Shaila Dewan & Al Baker, *Owners of Nursing Home Charged in Deaths of 34*, N.Y. TIMES, Sept. 14, 2005, at A1.

134. A FAILURE OF INITIATIVE, *supra* note 133, at 1–5 (detailing the systemic failure).

135. In the case of Katrina, Michael Brown, the head of FEMA, has come to personify the failure of the government. *See* Scott Shane, *Michael DeWayne Brown: Facing Blame in a Disaster*, N.Y. TIMES, Sept. 7, 2005, at A22; Mimi Hall, *Testimony: FEMA Chief Slow to Grasp Enormity of Katrina*, USA TODAY, Oct. 21, 2005, at 6A.

136. Compared to the speed and efficiency of private organizations, “government was abysmally slow to react.” Dennis Behreandt, *Katrina Exposes Fatal Flaws; Hurricane Katrina Did More Than Destroy the Gulf Coast. It Laid Bare the Failure of Government at All Levels*, NEW AM., Oct. 3, 2005, at 12.

137. *See* Justin Fox, *A Meditation on Risk: Hurricane Katrina Brought Out the Worst in Washington and the Best in Business*, FORTUNE, Oct. 3, 2005, at 50, 52; Devin Leonard, *The Only Lifeline Was the Wal-Mart*, FORTUNE, Oct. 3, 2005, at 74, 77.

138. A day after the storm, Home Depot opened twenty-two of thirty-three stores in the impact zone, and within a week only four stores were closed (four out of nine stores in New Orleans). Fox, *supra* note 137, at 52. Home Depot’s feat was not so unique. Hurricane Katrina shut down 126 Wal-Mart stores in the Gulf Coast area, and as of September 16, 2005, all but thirteen stores were operational. Leonard, *supra* note 137, at 76–77.

absence of government services.¹³⁹ It is reported that private firms offered assistance to the government in its disaster relief efforts but it was slow to act on the offers,¹⁴⁰ presumably because of incompetence, indifference or bureaucratic pride. Many months after the storm, when the full extent of the disaster was apparent to all and when the motivation to make right would have been the greatest, private contractors were far quicker to provide the same remedial services (cleanup) to the region than their government counterparts.¹⁴¹

It is easy to see how the managerial, logistical and technological expertise of large, sophisticated private firms can provide superior services under crisis conditions.¹⁴² With the exception of the military, which operates under a hierarchical, centralized command structure, government agencies simply cannot compete with the technical expertise of assessing risk, allocating resources, taking decisive action, and holding individuals accountable. The corporate organization is marked by centralized management and clear lines of communication, responsibility and accountability. If management expertise is the “brains” of a business operation, entrepreneurial spirit is the self-interested “heart.” I do not suggest that any single private entity would have done better than the government had it been in charge of the crisis management of the Gulf Coast region.¹⁴³ Nor do I suggest that it is possible for large private firms to assume primary responsibility of public crisis management. The task may have been too great for any single entity, public or private. But one wonders

139. See Artelia C. Covington, *Companies Offer Donations, Services to Hurricane Katrina Relief Efforts*, TRANSPORT TOPICS, Sept. 12, 2005, at 5; Rich Karlgaard, *Wonderful Wealth*, FORBES, Oct. 10, 2005, at 43; Bill Steigerwald, *Government Can Take Lesson From Wal-Mart*, PITTSBURGH TRIBUNE-REV., Oct. 14, 2005.

140. See Jonathan Birchall et al., *Hurricane Katrina: Federal Agency “Slow” to Accept Business Help*, FIN. TIMES, Sept. 5, 2005, at 6 (“From Wal-Mart’s satellite-based communications systems to FedEx’s aircraft, [U.S.] business has in some cases managed to provide a swifter response to the initial impact of hurricane Katrina than the federal and state authorities. But critics of the handling of the crisis by government agencies said they were slow in accepting offers of help.”); Behreandt, *supra* note 136, at 13 (“Incredibly, in some cases the federal response has been to stop aid from getting through. According to the *Pittsburgh Post-Gazette*, Homeland Security officials were blocking the Red Cross from New Orleans.”).

141. Private contractors hired by the government have been far more effective in the Gulf Coast cleanup than the Army Corps of Engineers. See Eric Lipton, *On Gulf Coast, Cleanup Differs Town to Town*, N.Y. TIMES, Dec. 26, 2005, at A1.

142. Corporations like these routinely hire the best business and technical minds, including PhDs in operations, applied mathematics, management sciences, finance, and information technology. Successful corporations can be viewed as thinktanks with execution capabilities.

143. “Markets and corporations may be the greatest risk processors mankind has yet devised, but that isn’t to suggest that corporations can or should supplant government. Elected officials have it much tougher than CEOs: Home Depot had to get its stores open, not evacuate a city.” Fox, *supra* note 137, at 52.

what might have been the result or how many lives could have been saved if a corporate-like management team with a clear mandate, supported by the authority and virtually unlimited resources of the government, had been tasked with the disaster preparation and relief efforts. In explaining the difference between the efficiency of private actors' reaction to Katrina and that of the government's, the economist Thomas Sowell observed in an editorial:

In both emergency times and normal times, governments have different incentives than private businesses. More fundamentally, human beings will usually do more for their own benefit than for the benefit of others. The desire to make money usually gets people in gear faster than the desire to help others.¹⁴⁴

This thought simply harkens back to Adam Smith's original point that "[i]t is not from the benevolence of the butcher, the brewer, or the baker, that we expect our dinner, but from their regard to their own interest."¹⁴⁵ While it is unfair to compare the tasks of coordinating a multi-state, multi-government disaster planning with protecting the businesses of even a large firm like Wal-Mart, it is also undisputed that the "failure of initiative," a perplexing "passivity" of government, magnified the consequences.¹⁴⁶ A comparison to the response of private actors under the same conditions shows no such paralysis.

IV. EFFICIENT ADMINISTRATION

At issue is not the theory of government, arguably the more interesting intellectual issue. Here rich are the ideas advanced by legal and political science scholars. Katrina, however, exposed the weakness in the practice of government, the mundane details in which services are delivered and programs are managed efficiently. The problem lies in management, communication, operations, organizational behavior, and structure. Here the field of study is an academic orphan, not finding a comfortable home in schools of law, political science, or business. I suppose the most applicable scholarship in these administrative issues is management study, but even here the application to governance would require an interdisciplinary approach as efficiency and profit often give way to welfare and public good.

144. Thomas Sowell, *Observe Private Businesses' Quick Response to Katrina*, DESERET MORNING NEWS, Sept. 29, 2005, at A15.

145. ADAM SMITH, AN INQUIRY INTO THE NATURE AND CAUSES OF THE WEALTH OF NATIONS 15 (Edwin Cannan ed., Modern Library 1994) (1776).

146. A FAILURE OF INITIATIVE, *supra* note 133, at 359.

The modern theory of public administration traces its roots to *The Study of Administration*, an essay published in 1887 by Woodrow Wilson, then a thirty-one year old Princeton University professor.¹⁴⁷ Wilson noted that in a democratic form of government “the hardest of hard things is to make progress.”¹⁴⁸ To solve this problem, he espoused a system in which elected officials set policy and this policy would be executed by a hierarchical structure managed by a corps of civil servants.¹⁴⁹ The idea assumed a vertically integrated services delivery system with the government at the control. In the twenty-first century, these ideas seem obsolete as the process of devolution has undermined the Wilsonian tradition.¹⁵⁰ Albeit the ideas are outdated, his ideals still have vitality. He thought of public administration as “a field of business.”¹⁵¹ The goal was for government to be “efficient”¹⁵² and to “make its business less unbusinesslike.”¹⁵³ A corps of civil servants, a “semi-corporate body” as he described it, must have thorough training and technical expertise in delivering services, and the acquisition of such skill sets was “a plain business necessity.”¹⁵⁴ He anticipated the problems of devolution and warned: “If [power] be divided, dealt out in shares to many, it is obscured; and if it be obscured, it is made irresponsible The less his power, the more safely obscure and unnoticed does he feel his position to be, and the more readily does he relapse into remissness.”¹⁵⁵ This warning resonates today. Katrina exposed the incentive for inaction within the context of group dynamics. Action, such as a mandatory evacuation or mobilization of vast resources, would require the assumption of individual responsibility. What would have been the political fallout if an entire city was forced to evacuate and the storm passed without calamity?¹⁵⁶

Wilson’s theory of efficient governance is consistent with the general theory of modern corporate management. Every successful company has a highly trained workforce, centralized reporting, ability to assess and mitigate risk, employees acting under proper incentives, and clear lines of responsibility and accountability. Governance today involves the

147. Woodrow Wilson, *The Study of Administration*, 2 POL. SCI. Q. 197 (1887).

148. *Id.* at 207–08. “Wherever regard for public opinion is a first principle of government, practical reform must be slow and all reform must be full of compromises.” *Id.* at 208.

149. *Id.* at 216.

150. KETTL, *supra* note 127, at 51–54.

151. Wilson, *supra* note 147, at 209.

152. *Id.* at 213.

153. *Id.* at 201.

154. *Id.* at 216.

155. *Id.* at 213–14.

156. A FAILURE OF INITIATIVE, *supra* note 133, at 2 (despite fifty-six hours of advanced warning state and local officials did not order an evacuation until nineteen hours before landfall).

management of disaggregate parts into a cooperative enterprise, not unlike the workings of the private market. In this sense, the question is one of organization. In *The Nature of the Firm*, Ronald Coase answered the question: Why do economic actors organize to form a firm? The key, as Coase identified it, is the cost of procuring cooperation:

The main reason why it is profitable to establish a firm would seem to be that there is a cost of using the price mechanism. The most obvious cost of “organi[z]ing” production through the price mechanism is that of discovering what the relevant prices are The costs of negotiating and concluding a separate contract for each exchange transaction which takes place on a market must also be taken into account A factor of production (or the owner thereof) does not have to make a series of contracts with the factors with whom he is co-operating within the firm, as would be necessary, of course, if this co-operation were a direct result of the working of the price mechanism.¹⁵⁷

The corporate form is economically justified in part because it reduces the procurement of cooperation by various economic actors, thus producing cost efficient transactions. The same cannot be said for the bureaucracies at work now. In Katrina we saw that the government was structurally ill-suited for crisis management. In a sudden crisis, the myriad of governmental bodies and agencies at the various federal, state, and local levels could not coordinate a proper response.¹⁵⁸ The cooperative costs were high. Moreover, whereas Wilson envisioned a corps of highly motivated and skilled technocrats, the reality is that government bureaucracies are not magnets for the most talented workforce (i.e., merit does not necessarily result in advancement).¹⁵⁹ This applies from political appointees to lines workers. In an interview, Secretary Michael Chertoff made the stunning admission that government agencies lack “the skill set” to do “preparedness” functions.¹⁶⁰ Perhaps this comment was intended to deflect criticism, an excuse for the poor performance of his agency, but the admission has a ring of truth. In a subsequent investigation, Congress found that “all levels of government

157. R. H. Coase, *The Nature of the Firm*, 4 *ECONOMICA* 386, 390–91 (1937).

158. A FAILURE OF INITIATIVE, *supra* note 133, at 1 (finding a failure to communicate and coordinate among various agencies).

159. This is seen in the relative prestige of having a government job. In my native country of Korea, a bureaucratic government position signifies prestige and power. Unless one has a political position with a plum title, that is not the case in the United States.

160. Evan Thomas, *Michael Chertoff: ‘What the Hell’s Going On?’*, *NEWSWEEK*, Dec. 26, 2005, at 54–55 (quoting Michael Chertoff, Secretary of the Department of Homeland Security). Additionally, Secretary Chertoff noted that a failure to coordinate and inter-agency bureaucratic disputes hindered the initial response to Katrina. *Id.*

lacked flexibility and adaptability” in responding to the fast changing events of a major catastrophe.¹⁶¹ While not surprising, these realities have profound implications for the future of catastrophe management.¹⁶²

The problems of “skill set” and structural capacity are daunting. In my earlier article, I posited that government programs may encounter a structural problem when attempting to distribute services:

[T]he government is but a single entity, and a single department within an agency typically manages any given government program. These micro-agencies, subject only to bureaucratic oversight, cannot compete with the private market, which is subject to the collective forces of supply and demand, innovation and strategy, and incentives and disincentives.¹⁶³

Again, the flood insurance program is a good example. Not only is the flood program structured poorly from an economic and risk management perspective, the *management* of the program has major problems as well. The NFIP is managed by FEMA, an agency within the Department of Homeland Security. Within FEMA, only about 40 FEMA employees and 170 contractors constitute a micro-agency that manages the entire flood insurance program.¹⁶⁴ The NFIP has about 4.6 million policyholders in about 20,000 communities, and it has paid about \$14.6 billion in claims as of August 2005.¹⁶⁵ Hurricanes Katrina and Rita would add another \$15 to \$25 billion in claims.¹⁶⁶ Obviously, the program is vast and could constitute the entire business of a publicly traded insurance company. Absent substantially more resources, the program cannot be effectively managed as a vertically integrated structure.

Lacking resources, the agency outsources the day-to-day management responsibilities to the private sector. About ninety-five percent of in force policies are written by private insurance agents representing ninety-five

161. A FAILURE OF INITIATIVE, *supra* note 133, at 1.

162. In the case of terrorism risk, even several years after 9/11, the state of preparedness has been abysmal. *See generally* 9/11 PUB. DISCOURSE PROJECT, FINAL REPORT ON 9/11 COMMISSION RECOMMENDATIONS (2005). This report provides a “report card” on government’s work in various areas of emergency and terrorism readiness. *See id.* The 9/11 Commission identified 41 areas of terrorism readiness that were graded from “A” to “F.” *See id.* Evidently, the government’s GPA is 1.78. This would be rather humorous but for the fact that the 9/11 Commission’s intent was serious and terrorism is no laughing matter.

163. Rhee, *supra* note 1, at 492.

164. GAO, IMPROVEMENTS NEEDED IN NFIP, *supra* note 102, at 15.

165. *Id.* at 2.

166. U.S. GOV’T ACCOUNTABILITY OFFICE, GAO-06-183T, FEDERAL EMERGENCY MANAGEMENT AGENCY: OVERSIGHT AND MANAGEMENT OF THE NATIONAL FLOOD INSURANCE PROGRAM 2 (2005).

private insurers that issue policies and adjust claims.¹⁶⁷ These insurers, called “write-your-own companies,” receive about a third of the premium income and remit the remainder to the government.¹⁶⁸ Additionally, they receive about 3.3% of the incurred losses as compensation for claims adjustment services.¹⁶⁹ The incentives created by this compensation structure are perverse: private insurers profit more from the program if they issue more policies *and* incur more losses. The program has suffered from repetitive loss properties, which account for only one percent of insured properties but for twenty-five to thirty percent of claims.¹⁷⁰ Repetitive loss is indicative of adverse selection, and the root cause is grounded in a policy requiring only high risk properties to obtain insurance.¹⁷¹ FEMA is charged with assuring a minimum level of quality control in the program, but the oversight of private insurers has been problematic.¹⁷² The agency’s quality control methods have been found to lack “statistical validity,” and so the agency does not have the information needed “to have reasonable assurance that program objectives are being achieved.”¹⁷³ Again, the fundamental problem is devolution as noted by the GAO: “It is a difficult challenge to meet, as services are delivered primarily through a decentralized system of private-sector contractors, their employees, and their subcontractors.”¹⁷⁴

The chief competitive advantage of government is vast financial resources. In the simple task of distributing welfare, the government is well-suited to perform this function. For example, the cost ratio of administering the Social Security program is three percent.¹⁷⁵ In the case of 9/11, the government successfully provided compensation to victims through the September 11th Victims Compensation Fund while at the same time limiting the costs associated with the prosecution of tort liability.¹⁷⁶ But

167. GAO, IMPROVEMENTS NEEDED IN NFIP, *supra* note 102, at 13.

168. *Id.*

169. *Id.*

170. GAO, CHALLENGES FACING THE NFIP, *supra* note 107, at 6.

171. 42 U.S.C. §§ 4012(b), 4012a(a), 4013(b)(2) (2000).

172. *See* GAO, IMPROVEMENTS NEEDED IN NFIP, *supra* note 102, at 22.

173. *Id.* at 28. Under the Flood Insurance Reform Act of 2004, FEMA is mandated to implement new processes and requirements for selling flood insurance. Pub. L. No. 108-264, § 104, 118 Stat. 712, 722 (2004). But FEMA has not fully implemented the statute. GAO, IMPROVEMENTS NEEDED IN NFIP, *supra* note 102, at 32–34.

174. GAO, IMPROVEMENTS NEEDED IN NFIP, *supra* note 102, at 34.

175. Rhee, *supra* note 1, at 462 n.130.

176. *Id.* at 481–82. The Fund has been criticized on various grounds. *See* George L. Priest, *The Problematic Structure of the September 11th Victim Compensation Fund*, 53 DEPAUL L. REV. 527, 529 (2003) (criticizing the fund on the basis that “it lacks any internal rationale of definition or constraint” found in the systems of compensation provided in society). Despite criticism, the Fund has largely been successful in providing compensation. “In the end, 2879 claims out of 2976 deaths (representing 97%) were filed.” Rhee, *supra* note 1, at 481 n.235

when it comes to managing complex endeavors like flood risk mitigation or crisis management, there is a substantial question of whether the government is structured to meet this challenge or has the necessary skill sets.

V. WHAT NOW?

In an era of mega-catastrophes, governance can significantly amplify risk. This is the fundamental lesson of Katrina, and one that should never be forgotten. Mitigation of risk is a moral mandate. The task is to “straighten the paths of government.”¹⁷⁷ In the twenty-first century, the Wilsonian model of centralized service is outdated, the path of governance no longer vertical, and the “private-public partnership” unavoidable. Government service is often delivered through a network of providers, which increasingly involves the participation of quasi-private and private firms. The concept of a “private-public partnership” is less a self-defining policy than a blank canvass on which interested parties paint the picture as they see it. In the case of flood insurance, private insurers write and adjust policies and the government pays claims. In the case of 9/11, it construed the concept as the provision of free reinsurance at the expense of taxpayers.¹⁷⁸ But if the risk of natural catastrophes and their collateral risk are to be mitigated, this partnership must be more than the distribution of funds from the government to the private sector. The private market is more adept at assessing complex risks than the government, and this fact must be exploited. Incentives should be properly aligned among individuals, private firms and government. The following examples are some discussion topics, which are embryonic in development and intended only to spur further dialogue.

A. Catastrophe Pool and Taxation

As currently configured, the flood insurance program is really a welfare distribution scheme cloaked in insurance terms. The source of funding is the same as ex post disaster relief, namely the taxpayer. Imagine a government mandated, universal “catastrophe insurance” program wherein the premium,

(citing LLOYD DIXON & RACHEL KAGANOFF STERN, RAND INSTITUTE FOR CIVIL JUSTICE, COMPENSATION FOR LOSSES FROM THE 9/11 ATTACKS 24–25 (2004)).

177. Wilson, *supra* note 147, at 201.

178. See Rhee, *supra* note 1, at 487 (stating that “many of the key players in the insurance market have experienced and benefited from a ‘partnership between the private and public sectors,’ a euphemism for a government cost-sharing program”).

say \$100,¹⁷⁹ is deducted automatically from tax returns and is set uniformly across the nation irrespective of risk or wealth. Would this scheme be perceived to be fair? What would a taxpayer with an average \$250,000 home in Cleveland think about funding the lifestyle of a taxpayer in Miami with a modest \$250,000 oceanfront condominium?¹⁸⁰ The perception may be that this would be unfair. Compounding this problem of fairness is the fact that the government's ex post response to catastrophes is not uniform in policy or welfare distribution. To the extent that welfare is distributed unevenly to disaster prone areas, there is an implicit catastrophe tax that is not adjusted for income, wealth or risk.

Perhaps a nationally mandated catastrophe insurance is in order, but such a program would require a separate agency to manage it just as the flood insurance program is managed (badly) by FEMA—all in all, not an optimal solution. If catastrophes are funded by general revenue, however, the tax infrastructure could be used to collect a catastrophe pool. This “catastrophe tax” could be structured progressively, allowing for the risks associated with the geographic region and perhaps property value at risk. Such a scheme would not be insurance in the sense that the tax is based on individual actuarial risk. Instead, it would be a pooling arrangement. The risk could be broadly categorized, maybe on a state by state basis, having a rational relationship to catastrophic risk and yet not requiring a bureaucratic infrastructure to support individualized actuarial underwriting. Such a scheme is a tradeoff, but could be a more fair system than the current one, which continues to fund catastrophic risks indifferently.

B. Reduction of Coordination Costs

Before Katrina, it was commonly believed that FEMA was the agency that could coordinate emergency response.¹⁸¹ That idea is no longer valid. I question whether the solution simply lies in “fixing” the personnel problems, or restructuring the agency within the broader government. Just as the organization of private firms reduces transaction costs, governance must reduce the cost of coordination. The problem is that more than one agency is involved in disaster coordination. It is a natural bureaucratic

179. The average flood insurance premium as of June 2005 was \$446. GAO, IMPROVEMENTS NEEDED IN NFIP, *supra* note 102, at 8.

180. The maximum coverage under NFIP is \$250,000 for home and \$100,000 for personal property. 42 U.S.C. § 4013(b)(2)–(3) (2000).

181. A FAILURE OF INITIATIVE, *supra* note 133, at 13 (noting that “FEMA is not a first responder with the resources to assume principal responsibility for overwhelmed state and local government during a disaster”).

instinct to acquire as much power as possible, and in the ensuing competition that power is diffused throughout the various levels and branches of government. As Wilson noted, divided power results in irresponsible exercise, the precise situation created in Katrina.¹⁸² The notable exception is the military, which once called upon, performed well.¹⁸³ The explanation is that the military, like private firms, has deep experience in planning and executing complex tasks.

Disaster response must be branded so that the responsibility (accountability) is “unmistakably fixed”¹⁸⁴ on a specific group. Presumably, this group would include governmental and nongovernmental bodies.¹⁸⁵ Coordination with private firms should be a part of the strategy. Consider how the logistics and distribution capabilities of firms like Wal-Mart and FedEx, or the disaster relief experiences of the Red Cross and Oxfam, can affect the provision of disaster relief. Of course, private for-profit firms are not in the business of disaster relief. In the case of Katrina, the provision of goods and services was a matter of charity (and presumably smart marketing of corporate image). It is a challenge to incorporate private firm expertise in a traditional government service. But this has been the trend in government services. We see this phenomenon in such disparate functions as the provision of flood insurance and the invasion and occupation of Iraq in which private security firms have played prominent roles.¹⁸⁶ As yet, for-profit firms have not assumed a substantial role in crisis management, but business models can be adapted with the right incentives, which may include government contracts as well as the marketing advantage of having corporate identities fixed in part to the noble cause of disaster relief. The broad approach should be to find the right combination of players who bring the “skill set” and to marginalize the roles of others if the cost of coordination outweighs any potential benefit.

C. Elimination of Subsidies for Bad Risks

This means that flood insurance, as currently structured, should be phased out. It is subject to abuse by private insurers and policyholders, and a national program as complex as flood insurance and risk mitigation cannot

182. Wilson, *supra* note 147, at 213.

183. A FAILURE OF INITIATIVE, *supra* note 133, at 14 (“The mobilization was massive and, at least once the call went out, swift and effective.”).

184. Wilson, *supra* note 147, at 213.

185. See Stephanie Strom, *After Storm, Relief Groups Consider More Work in U.S.*, N.Y. TIMES, Jan. 1, 2006, at A14.

186. See, e.g., SINGER, *supra* note 131, at 230–42.

be effectively managed by a micro-agency of 210 employees. Repetitive loss experience proves that flood insurance incentivizes risk-taking. Rather than spending billions to underwrite bad risk and fight nature, the government could assist people in relocation. As discussed, flood insurance affects the poor the most, as wealthier people tend to have options on habitation decisions. The poor lack choices, and it is a suspect assumption that this class enjoys being flooded from time to time so long as compensation is available.

There is a social cost to not subsidizing bad risk, in that certain susceptible communities will shrink in population or ultimately die. But the price may be worth it in the long-term as less value is placed in harm's way. This applies to both small communities, which are more portable and perhaps expendable, and larger cities, which obviously present more complex problems. With respect to the costs involved in the post-Katrina solution, the question is whether New Orleans should be rebuilt to its old self, and if so, whether the new system of levees should be built to the old standards as well. In any given year, New Orleans could experience a similar hurricane or worse. The risk is the same (or worse if global warming continues). It seems that the rational choice is bipolar—either rebuild with a far stronger defense system, or allow a natural demise of the city. Both choices have moral as well as economic facets. The fear is that economics and morality would be compromised. The political price of the sensible choice—telling citizens that the cost for maximum protection is prohibitive, or telling them that the government will no longer subsidize the assumption of high catastrophic risks—may be too high. A compromise may be struck, returning New Orleans to its pre-Katrina state, a decidedly unsafe condition. Thus, government action may sow the seeds of another future disaster.

VI. CONCLUSION

This essay does not purport to address the full panoply of problems or solutions to natural catastrophic risk. Rather, the goal of this essay is modest—to show briefly another perspective of the causality and consequence of natural catastrophes and to raise some possible topics for future discussions of catastrophic risk and governance. Risks are perceived through human filters, and defined by our values and sensitivity to losses. The myriad of human activities and choices cross paths with catastrophes to create greater misfortunes. To the extent that government influences societal activities and individual choices, which is to say it is a principal actor, it has a fundamental role in risk management. Proper risk management is more than an economic issue; it is a moral imperative. The failure to manage risk

was evident in the response to Katrina. That government failed is undisputed, but theories of how and why and the proposed fixes will surely diverge as history unfolds. This article discusses the role of governance in the management of catastrophic risks. Superficially, Katrina was a failure of execution, which implies an accident, a one time event in which the natural event was so large that it overwhelmed the government. On a deeper level, the catastrophe is rooted in the structural limitations of government in this modern era, which implies incapability. If so, the implication is that we can expect more failures of effective governance in catastrophe onset crises. Katrina was not the first catastrophe in which government failed to either perceive or manage risk. Nor, I fear, will it be the last.
