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*A Preliminary  
Benefit/Cost Framework  
for Counterterrorism  
Public Expenditures*

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## Preface

This report examines a number of public finance issues related to large public expenditures for counterterrorism policies. Foremost in any discussion on the subject is derivation of rough estimates of the aggregate benefits and costs attendant upon such an effort. The analysis approach in this report should provide a framework for benefit/cost analysis of particular policies, and thus for construction of rough but reasonable ranking among the myriad potential actions decisionmakers might consider. The study should be of interest to analysts and policymakers involved in allocating resources in the wake of the September 11, 2001 attacks. Research and writing were completed in February 2003.

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## Summary

This report develops rough estimates of the benefits and costs of U.S. public-sector spending engendered by the terrorist attacks of September 11, 2001, in the context of “moderate-,” “severe-,” and “nuclear-” case terrorist activities waged against the United States. The moderate case uses the 1999 experience in Northern Ireland, scaled up to be proportional to the U.S. population. The severe case uses the recent Israeli experience, while the nuclear-case analysis assumes terrorist use of nuclear weaponry against U.S. targets. The study for the most part shunts aside the “Why do they hate us?” issue prominent in popular discussion, focusing instead upon the benefits and costs of policies designed to reduce both the ability of terrorist groups to undertake attacks and the damage likely should they succeed. The definition of “terrorism” used is that specified in Title 22 of the United States Code, section 2656f(d), which in summary comprises attacks upon noncombatants—both civilian and military—and upon military installations and armed military personnel under certain conditions.

Annual deaths and injuries attendant upon the moderate, severe, and nuclear cases are estimated crudely at 1,175/8,700, 15,500/114,500, and 50,000/300,000, respectively. The direct adverse economic effects of terrorist attacks include deaths and injuries, property damage, and reduced economic output. For the moderate, severe, and nuclear cases, those costs are estimated at about \$11 billion, \$183 billion, and \$465 billion per year, respectively. These costs are based on findings in the economics literature of a “value” of \$4 million per life and \$40,000 per injury. Physical damage is estimated crudely at 25 percent of the deaths/injuries cost. Estimates for Israel (our proportionate severe case) suggest a gross domestic product (GDP) loss of about 1 percent; accordingly, we assume GDP losses for the three cases at 0.05 percent, 1 percent, and 2 percent, respectively.

Federal government spending has increased approximately \$95 billion in the aftermath of the September 11 attacks—for reconstruction, humanitarian and economic aid, defense, and domestic security functions. Because a substantial part of this spending is for collective goods benefiting the nation as a whole, fiscal choice under majoritarian democracy may yield spending levels lower than those efficient socially. Special-interest subsidies, perhaps seemingly inefficient, are one tool with which to move budgets for such collective goods as defense closer to optimal levels, and thus may be efficient in the larger context. (Such

special-interest subsidies may be efficient for other reasons as well.) Another tool is the use of tax earmarking, with a tax base complementary with the benefits of the counterterrorism effort.

Because the public-sector acquisition of resources imposes real costs upon the economy, the true economic cost of spending \$95 billion is greater; the literature suggests that doubling that number is reasonable or even conservative as a rough estimate. In addition, states and localities will contribute to the security effort; various reports suggest an annual figure of \$5 billion, to which we add \$1 billion as the cost of acquiring resources. These public-sector costs sum to \$196 billion annually. Accordingly, we assume the real annual resource cost of U.S. counterterrorism efforts in our three cases to be \$10 billion, \$200 billion, and \$300 billion, respectively. When added to the direct costs accruing from the terrorist acts, total annual terrorism/counterterrorism costs in the three cases are approximately \$21 billion, \$383 billion, and \$765 billion, respectively.

There is evidence that the ongoing counterterrorism effort has had important beneficial effects, but because “units” of counterterrorism are difficult to define, the more central issue of balancing marginal benefits and costs must be the subject of future research. At the same time, the rough correspondence of total benefits and costs suggests that the United States is not obviously spending too much, in that such important benefits as enhanced national pride cannot be quantified. The same is true for such nonquantifiable costs as a possible future reduction in civil liberties attendant upon a national counterterrorism effort. If total benefits are significantly greater than total costs, then it is at least plausible that marginal benefit is not exceeded by marginal cost, in that the former is likely to be falling with an expanding counterterrorism effort, and the latter is likely to be rising. Moreover, it may be reasonable to assume that the costs inflicted by terrorists might be substantially greater if a significantly smaller counterterrorism effort were pursued. Moreover, the counterterrorism effort is largely a fixed cost, much like urban policing services, with personnel, capital, and systems put in place in advance. This suggests that the (short-run) marginal cost of preventing terrorist attacks may be small or zero. This analysis defines a “bombing-equivalent” as a marginal benefit of attack prevention, estimated at about \$22 million based upon the recent Israeli experience. It further suggests that marginal benefit may exceed marginal cost, in which case spending may in fact be too little.

It may be appropriate for the federal government to finance certain state and local efforts, in that some benefits of such activities may accrue to neighboring jurisdictions. Moreover, many states are constrained in their fiscal structures because only certain types of investment may be financed with debt; but to the

extent that future generations benefit from the counterterrorism effort, the use of debt may be efficient, and federal fiscal transfers may be appropriate if financing rigidities at the state and local level must be preserved to maintain fiscal discipline. This argument is not driven by the observation made by some that the federal government is “wealthier” than the states and localities taken collectively—that observation is problematic even though the federal government can acquire resources by inflating the currency and by borrowing for current consumption, and even though the federal government has more monopoly power in taxation than states and localities have.

A number of private adjustments made by many people in the face of terror threats can be assumed to impose significant costs that are difficult to measure. An example is the substitution of automobile travel in place of air travel. Moreover, in a game-theoretic framework, it may be efficient to invest (or make a credible commitment to invest) more in counterterrorism efforts than such efforts are worth defined narrowly, as a means of deterring attacks. Finally, the preservation of national pride, however difficult to measure, is likely to be a collective good of some importance, perhaps as captured by a stance of “millions for defense, not one cent for tribute.”

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# 1. Introduction

Several important issues in the benefit/cost analysis of counterterrorism public expenditures make up the primary focus of this paper, the central purpose of which is the development of a range of rough estimates of the benefits and costs of a U.S. counterterrorism effort, as engendered by the attacks of September 11, 2001. This approach should provide a framework for benefit/cost analysis of particular policies, and thus for construction of a rough but reasonable ranking among the myriad potential actions—or classes of actions—available for decisionmakers to consider.

The monstrous events of September 11, 2001 have elicited strenuous efforts to mitigate the attendant suffering, destruction, and ensuing impacts, whether economic or noneconomic, and to find ways to reduce both the likelihood and effects of possible future attacks upon Americans and American interests. Such actions inevitably are undertaken along a broad spectrum of decisionmaking, from individuals changing travel plans, businesses implementing security measures, and other such private choices to large and highly visible actions implemented by the federal government in pursuit of the collective good. That the range of such potential responses is enormous yields two related but distinct sets of questions: first, how to choose among the vast array of actions available—after all, not everything can be done in a world of limited resources—and second, how to allocate among alternative institutions the responsibility for making such choices.

The report's general premise that the second question is perhaps the more fundamental<sup>1</sup> is addressed later. Although it is likely that an aggregate counterterrorism effort would prove more effective were responsibilities for choosing among alternative actions determined first, with specific policies and actions then chosen by the attendant decisionmaking institutions, we formulate an analytic framework applicable to any level of government (although more likely to be of interest to federal decisionmakers). This allocation of responsibilities is not random; those institutions—the federal government, state and local governments, the private sector, individuals, and families—differ

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<sup>1</sup>In other words, under the reverse procedure, actions (policies) would be chosen and then responsibility for implementing them would be distributed among the institutions.

sharply in their goals and incentives, tools with which to implement policies and actions, available information, and abilities to implement effective measures. It is those differences that should be exploited in the allocation of responsibilities, as the American society writ large pursues greater net effectiveness in its counterterrorism efforts.

Moreover, choices made by different levels of government and by the private sector are not independent. Even in the absence of joint planning or other sorts of formal coordination, implicit coordination can be expected to emerge as various actors exploit their own comparative advantages even as they assume some of the actions taken by others to be independent of their own, and other such actions not. Accordingly, one central assumption here is that these alternative institutions, while obviously potential substitutes in the implementation of given policies, nonetheless fundamentally are complementary in the sense that an efficient allocation of responsibilities can yield a maximum benefit from a given investment of resources.<sup>2</sup>

However, the central focus of this report is the prospective economic cost of a terrorist war directed against the United States—that is, the (potential) benefit of countering the war—and the prospective economic cost of fighting and deterring it. Analysis of the benefits (or effectiveness) and costs of individual policy proposals, while a crucial long-term analytic need, lies beyond the scope of this report.

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<sup>2</sup>More than a year after the terrorist attacks, federal action is wide-ranging, continuing, and expanding upon long-standing efforts, with, however, an obvious change in the relative importance of the various approaches. These efforts can be grouped under several headings: development assistance, promotion of democracy, and support for peace negotiations in troubled regions; a refusal to negotiate with terrorist groups, combined with efforts to find and prosecute the individuals planning or implementing terrorist attacks; construction of physical defenses against attacks; hindering terrorist groups through gathering of intelligence, financial controls, locating and arresting individuals at home and overseas, and the like; covert operations; and military actions against regimes supporting terrorist activities. See, for example, Paul Pillar, *Terrorism and U.S. Foreign Policy*, Washington, DC: Brookings, 2001. The past and prospective effectiveness of such classes of activities—and the respective underlying views of the sources of terrorists' outlooks and actions—are the subjects of intense debate. See Timur Kuran, *The Islamic Commercial Crisis: Institutional Roots of the Delay in the Middle East's Economic Modernization*, Los Angeles: USC Center for Law, Economics, and Organization, Research Paper No. C01-12, March 9, 2001; Donald P. Green, Jack Glaser, and Andrew Rich, "From Lynching to Gay Bashing: The Elusive Connection Between Economic Conditions and Hate Crime," *Journal of Personality and Social Psychology*, Vol. 75, No. 1, July 1998; Daniel Pipes, "God and Mammon: Does Poverty Cause Militant Islam?" *The National Interest*, Winter 2001/02; Bernard Lewis, "The Roots of Muslim Rage," *The Atlantic*, September 1990; Bernard Lewis, "What Went Wrong?" *The Atlantic*, January 2002; Alan B. Krueger and Jitka Maleckova, "The Economics and Education of Suicide Bombers: Does Poverty Cause Terrorism?" *The New Republic*, June 24, 2002. See also Daniel Pipes, "Who Is the Enemy?" *Commentary*, January 2002; Michael Radu, *The Futile Search for "Root Causes" of Terrorism*, Philadelphia: Foreign Policy Research Institute, April 23, 2002; Frank J. Gaffney, Jr., "The Real 'Root Cause' of Terror," *FrontPageMagazine.com*, April 24, 2002; and Hillel Fradkin, "Why They Hate Us," *The American Enterprise*, December 2001. For more general discussions, see Fouad Ajami, *The Dream Palace of the Arabs*, New York: Vintage Books, 1998; Victor Davis Hanson, *An Autumn of War*, New York: Anchor Books, 2002; Michael A. Ledeen, *The War Against the Terror Masters*, New York: St. Martin's, 2002; Bernard Lewis, *The Middle East*, New York: Touchstone, 1995; and David Wurmser, *Tyranny's Ally*, Washington, DC: AEI Press, 1999.

At a purely conceptual level, efforts to reduce the terrorist threat can follow one or both of two paths. There can be efforts to reduce the incentives (or preferences) of terrorist groups to attack Americans, their property, and their institutional symbols, whether within the U.S. borders or overseas. Such efforts logically would follow upon the “Why do they hate us?” reflections prominent in the popular literature in the immediate aftermath of September 11; also highly relevant is whether reduced hatred or enhanced respect (or fear)<sup>3</sup> is the more appropriate goal of U.S. policy.<sup>4</sup>

Alternatively, there can be efforts to reduce the ability of such groups to launch attacks, and efforts in advance to reduce the damage caused by such attacks when they occur. Clearly, the underlying incentive to attack, defined broadly, is influenced by the ability to attack and by the likely effects of such attacks if undertaken. Nonetheless, we will focus upon the benefits and costs of policies designed to reduce the ability of terrorist groups to undertake attacks and the damage likely to follow upon them, and in so doing shunt aside the alternative issue of whether and how to reduce underlying grievances or other possible incentives for anti-American actions. Any such analysis would have to weigh the benefits of reduced “hatred” toward the United States, as purportedly deriving from various foreign and economic policies, cultural influences, and the like, against the other benefits derived from such policies and the nature of American society; however important, that is a general topic beyond our scope here.<sup>5</sup>

Section 2 briefly addresses some definitional issues and straightforward but important distinctions. Section 3 discusses the central adverse effects of terrorist acts under crude “moderate-,” “severe-,” and “nuclear-“ case sets of assumptions, along with the costs of countering such terrorist campaigns. Section 4 addresses the central benefit/cost issue by discussing marginal benefits and costs. Section 5 addresses several public finance issues—old-fashioned but

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<sup>3</sup>For example, efforts to use military means to impose severe penalties upon those pursuing terrorist activities presumably would reduce those incentives on net, but they might not affect underlying preferences; they are not related to the “Why do they hate us?” issue.

<sup>4</sup>Thus, for example, one might argue that a withdrawal of U.S. forces from Saudi Arabia—a purported source of hatred on the part of Osama bin Laden—would reduce the terrorist threat to the United States. See, for example, the prepared comments of William A. Niskanen for a debate on U.S. policy toward Iraq with James Woolsey, Cato Institute, December 13, 2001 (personal communication). See also Benjamin Schwarz and Christopher Layne, “A New Grand Strategy,” *The Atlantic*, January 2002. For an alternative view, see Charles Krauthammer, “Only in Their Dreams,” *Time*, December 24, 2001. See also the literature cited in fn. 2.

<sup>5</sup>Again, this shunts aside a number of central issues: whether such “hatred” overseas is a function of U.S. policies (i.e., choice variables) as opposed to the very nature of U.S. society and its political institutions as a competitor with such systems as fundamentalist Islam, whether it is such “hatred” that is centrally relevant as opposed to insufficient fear of U.S. military power, and the like. See, for example, Reul Marc Gerecht, “The Gospel According to Osama bin Laden,” *The Atlantic*, January 2002.

of renewed importance in the context of a substantial counterterrorism effort conducted publicly. The insurance market is addressed briefly as well. Section 6 offers conclusions and recommendations for further analysis.

## 2. Some Definitions

What do we mean by “terrorism”? No single definition enjoys universal application, but for the purposes here, this report adopts the definition presented in Title 22 of the United States Code, section 2656f(d):<sup>1</sup>

- The term “terrorism” means premeditated, politically motivated violence perpetrated against noncombatant targets by subnational groups or clandestine agents, usually intended to influence an audience.
- The term “international terrorism” means terrorism involving citizens or the territory of more than one country.
- The term “terrorist group” means any group practicing, or that has significant subgroups that practice, international terrorism.

The term “noncombatant” is defined “to include, in addition to civilians, military personnel who at the time of the incident are unarmed or not on duty.” Also defined as acts of terrorism are “attacks on military installations or on armed military personnel when a state of military hostilities does not exist at the site, such as bombings against U.S. bases in Europe, the Philippines, or elsewhere.” Note that this definition is narrower than that inherent in the policy made explicit by the Bush administration after the September 11 attacks, which includes governments (along with “subnational groups”) as engaged in terrorism if harboring or otherwise supporting terrorist groups or actions.

The definition includes both domestic and overseas interests or targets. It obviously includes civilian targets, but it encompasses military targets as well under a broad range of circumstances, and it does not distinguish between private- and public-sector targets. The private/public distinction is related to a separate difference between targets, whether owned privately or publicly, that (more or less) are of public concern, perhaps because they produce collective goods, and targets that primarily are of private concern.<sup>2</sup>

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<sup>1</sup>As quoted in Office of the Coordinator for Counterterrorism, U.S. Department of State, *Patterns of Global Terrorism 2000*, April 2001.

<sup>2</sup>The production of collective goods yields benefits that accrue to the economy (or society) at large, so that consumption of the good by one individual does not reduce the amount available for others; in contrast, the production of private goods, as a crude generalization, benefits the individuals consuming them. For collective goods, in the simplest case, those not contributing toward production costs cannot be excluded from consuming the good. Production of collective goods, at least in principle, tends to be concentrated in the public sector, while the opposite is true for private goods, although governments in the United States produce a broad array of such private goods as electric power, and private entities produce such (perhaps partial) collective goods as security

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services. The private sector produces as well vast amounts of information, under some circumstances a pure collective good. National defense generally, and deterrence of terrorist attacks in particular, are reasonable approximations of collective goods, although various individuals may value the good differently, in part because such defense and deterrence efforts may yield benefits that accrue more heavily to some than others. One could argue in addition that terrorist attacks by definition are "public" in the sense that an attack on, say, a building owned privately (or on an individual) increases perceived risks and fears in the community as a whole to a nontrivial degree. Even if the latter condition does not hold, it still may be efficient to organize defensive and/or preventive measures publicly, particularly if there are scale economies and organization/transaction costs in the production of such measures. For discussions of the private production of collective goods, see Jack Hirshleifer, "From Weakest-Link to Best-Shot: The Voluntary Provision of Public Goods," in Jack Hirshleifer, *Economic Behavior in Adversity*, Chicago: University of Chicago Press, 1987. For a discussion of implicit and explicit cooperation in the production of collective goods, see James M. Buchanan, *Demand and Supply of Public Goods*, Chicago: Rand McNally, 1968; Harold Demsetz, "The Competitive Production of Collective Goods," *Journal of Law and Economics*, 1968; and Earl Thompson, "The Perfectly Competitive Production of Public Goods," *Review of Economics and Statistics*, 1970. See also Steven J. Brams, *Game Theory and Politics*, New York: The Free Press, 1975, in particular sections 4 and 6.

### 3. Adverse Economic Effects of Terrorist Acts

This section discusses several categories of adverse effects attendant upon terrorist attacks, whether past or prospective. The loss of life and the injuries sustained are the most obvious, along with the property damage caused by terrorist violence. A number of economic effects are likely to ensue as well, some straightforward and others perhaps more subtle. Important long-run effects can be expected also in terms of the size and spending mix (or the “priorities”) of the public sector, with other shifts likely in addition.<sup>1</sup> Finally, such effects as possible shifts in national pride,<sup>2</sup> adverse psychological impacts, and so forth are likely to be important but essentially cannot be quantified.

#### Deaths and Injuries

Table 3.1 presents data on U.S. citizens killed and wounded in international terrorist attacks between 1995 and 2001.<sup>3</sup> The human and economic toll caused by the September 11 attacks make 2001 an outlier in terms of deaths, injuries, and destruction, but such a perspective may be useful for construct of a range of prospective casualties as a set of underlying analytic assumptions for benefit/cost analysis and policy formulation.<sup>4</sup> While still subject to some uncertainty, the deaths caused by the September 11 attacks now are reported at about 3,000, with injuries reported at about 6,500.<sup>5</sup>

<sup>1</sup>This is not to say that an expansion of the public sector in the abstract is necessarily “adverse.” As a result of terrorist attacks or threats, it is a response, however necessary, that otherwise would not be observed, and thus can be assumed to be a cost of the changed security environment.

<sup>2</sup>One could argue on the basis of considerable anecdotal evidence (and somewhat loose definition) that the net effect of the September 11 attacks and the U.S. response, both domestic and military, has been strongly positive in terms of national pride, to the extent that such a concept is meaningful analytically.

<sup>3</sup>It is unclear whether these data conform to the State Department definition of terrorist attacks noted above, particularly in terms of military personnel either armed or on duty. Moreover, the data before 2001 seem to exclude casualties among non-U.S. citizens inflicted during attacks on U.S. targets, and to include U.S. citizen casualties inflicted during attacks on non-U.S. targets; the death toll from the September 11 attacks includes non-U.S. citizens.

<sup>4</sup>Such a stance for planning purposes may be appropriate if risk aversion is important socially, or if the (future) threat is affected favorably by ongoing efforts to counter it, in the sense that an “irrational” decision to invest what might appear to be inefficiently large amounts in counterterrorism efforts might reduce the threat itself disproportionately. For the classic exposition of this argument, see Thomas Schelling, *Strategy of Conflict*, New York: Oxford University Press, 1963.

<sup>5</sup>Office of the Coordinator for Counterterrorism, U.S. Department of State, *Patterns of Global Terrorism 2001*, May 21, 2002, and Associated Press, December 14, 2002. See also U.S. Senate,

**Table 3.1**  
**U.S. Citizen Casualties from Terrorist Attacks,**  
**1995–2001**

Year	Killed	Wounded	Total
1995	10	60	70
1996	25	510	535
1997	6	21	27
1998	12	11	23
1999	5	6	11
2000	23	47	70
2001	~3,000	~6,500	~9,500

SOURCE: Office of the Coordinator for Counterterrorism, U.S. Department of State, *Patterns of Global Terrorism 2001*, May 21, 2002.

NOTE: Data for 2001 are not strictly comparable with data for earlier years.

For benefit/cost analysis of prospective policies, a planning range of future deaths and injuries expected from a terrorist war against the United States might be derived in part from the historical experience of other nations. The experience of Northern Ireland during a relatively quiet segment of the overall “Troubles” period of 1969 through 2000 might offer insights into the magnitude of casualties attendant upon a moderate-case terrorist campaign, whereas the Israeli experience during 2000–2002 may be relevant as a basis for severe-case planning purposes. A nuclear case would consider the potential use of nuclear weaponry.

At this point, a caveat is appropriate: A simple proportional scale-up for the United States for deaths, injuries, and damage experienced elsewhere is somewhat artificial, in that a rational terrorist organization would be likely to employ a strategic/tactical approach in the United States different from that used elsewhere, for a number of reasons. Those reasons include the large size, complexity, and resilience of U.S. society, among other large factors, and can be subsumed under the more-general problem of game-theoretic analysis, which lies far beyond the scope of this study. The proportionality approach used here is simply a device with which to derive a reasonable set of analytic assumptions based on empirical experience that at a minimum can be viewed as plausible.

Table 3.2 provides data on deaths and injuries suffered during the “Troubles” period in Northern Ireland from 1969 through 2002. Analogous figures in the table for deaths and injuries in the United States are derived as proportional to total population.

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Republican Policy Committee, October 2, 2001. Note that the September 11 casualty estimates are still under revision, and the U.S. government does not have “official” estimates of the September 11 casualty toll (personal communication with Mr. Joe Reap, U.S. Department of State Counterterrorism Office).

**Table 3.2**  
**Northern Ireland Deaths and Injuries from Terrorism, 1969–2002**

Deaths	3,523
Injuries	46,753
Incidents (shootings and bombings)	46,069
Average annual deaths/injuries	104/1,375
Annual deaths/injuries in 2001 U.S. population	17,435/230,519

SOURCES: U.S. Bureau of Census; Northern Ireland Statistics and Research Agency; Police Service of Northern Ireland; [http://cain.ulst.ac.uk/sutton/tables/Status\\_Summary.html](http://cain.ulst.ac.uk/sutton/tables/Status_Summary.html) (Conflict Archive on the Internet).

NOTE: 2001 population estimated at 1.7 million for Northern Ireland, 285 million for the United States. Total Northern Ireland incidents comprise shootings (35,890) and bombings (10,179); annual average is 1,355.

Table 3.3 shows the deaths and injuries data for Northern Ireland for four periods: 1969–1980, 1981–1990, 1991–1994, and 1995–2002. Data are shown separately for 1999. The relatively quiet period from 1995 through 2002 in Northern Ireland includes years that provide a benchmark assumption with respect to the effects of a moderate-case terrorist campaign; the seven-year period applied proportionately to the U.S. population in 2001 implies about 3,850 annual deaths and some 241,200 annual injuries. For Northern Ireland, 1999 was a year in which deaths and injuries were among the lowest—7 deaths and 878 injuries. For the United States, the proportionate numbers would be some 1,175 deaths and 147,200 injuries. The Northern Ireland death/injury ratio is much lower than the Israeli ratio, for reasons that are unclear. One reason might be the apparent practice of Northern Ireland paramilitary groups shooting suspected collaborators and others in the legs, a practice not reported in the Israeli/Palestinian case. In constructing our moderate-case bound, therefore, we adjust the U.S. casualty assumption based upon the Northern Ireland experience to conform the death/injury ratio more closely to the recent Israeli experience,

**Table 3.3**  
**Northern Ireland Deaths and Injuries from Terrorism, Four Periods and 1999**

Period	Deaths	Annual Average	Injuries	Annual Average
1969–1980	2,187	182	23,344	1,945
1981–1990	853	85	9,659	966
1991–1994	325	81	3,677	919
1995–2002	158	23	10,073	1,439
1999	7	—	878	—

SOURCES: Northern Ireland Statistics and Research Agency; Police Service of Northern Ireland; [www.cain.ulst.ac.uk/sutton/tables/Status\\_Summary.html](http://www.cain.ulst.ac.uk/sutton/tables/Status_Summary.html) (Conflict Archive on the Internet).

summarized in Table 3.4. Note that the data for Northern Ireland and for Israel are unlikely to conform strictly to the State Department terrorism definition, in that at least some of the casualties among security forces were suffered by personnel armed and/or on duty.

For the period September 29, 2000 through August 7, 2002, the Israeli Defense Forces report the casualty figures shown in Table 3.4. The Israeli data are for a period of about 22 months; as percentages of the population, deaths are about 0.01 and wounded are about 0.07. If we assume proportionality over that period, the annual toll would be about 331 killed and 2,438 wounded, or total casualties of approximately 2,769. One might assume that the terrorist war in which the Israelis find themselves is analogous to a severe case that might afflict the United States in future years, but not to a nuclear case in that the greater potential casualties threatened by the use of nuclear weaponry are assumed away. Because the U.S. population is some 47 times the Israeli population, one planning assumption for a severe-case scenario might be a U.S. casualty rate of approximately 130,000 per year, of which about 15,500 would be deaths and 114,500 would be injuries.

As noted above, the death/injury ratio is far lower in the Northern Ireland case than in the Israeli case. For Northern Ireland in 1999, the ratio is 7/878, or somewhat less than 1 percent; for Israel over the period September 29, 2000 through August 7, 2002, the ratio is 606/4,469, or about 13.6 percent. That latter ratio applied to the Northern Ireland death toll of 7 in 1999 yields an imputed injury figure of 52 (rather than the actual injury figure of 878); the figures proportional for the United States would be some 1,175 deaths and 8,700 injuries. Accordingly, we assume those figures as the moderate-case casualty level for analytic purposes, and 15,500 deaths and 114,500 injuries (the proportional Israeli case) as the severe-case assumption. Note that the two cases differ roughly by an order of magnitude.

**Table 3.4**  
**Israeli Terror Casualties: September 20, 2000 Through August 7, 2002**

	Civilians	Security Forces	Total	Annual Average	Annual Average Proportional to U.S. Population
Killed	424	182	606	331	15,500
Wounded	3,196	1,273	4,469	2,438	114,500

SOURCE: Israel Defense Forces at [www.idf.il/daily\\_statistics/english/6.gif](http://www.idf.il/daily_statistics/english/6.gif). Israeli population assumed at 6 million.

A nuclear case can be envisioned as the outcome of the acquisition (or construction) and use of nuclear weaponry by terrorist groups. The prospective sources, characteristics, and effects of such weaponry are highly variable and thus speculative, but some insights into the magnitudes of attendant casualties perhaps can be derived from the Hiroshima and Nagasaki bombings in August 1945. The weapon deployed over Hiroshima killed some 140,000 people immediately and over the course of the ensuing year, and destroyed or inflicted major damage on buildings up to three miles from ground zero. Consistent estimates of nonlethal injuries are difficult to find, but the number of persons qualifying for treatment under the A-bomb Victims Medical Care law of 1957 numbered about 350,000 as of March 31, 1990.<sup>6</sup> Accordingly, let us assume for purposes of constructing our range that 400,000 were injured. The weapon deployed over Nagasaki killed some 74,000 people by the end of 1945 and injured another 75,000.<sup>7</sup> About 50,000 buildings were destroyed or damaged beyond repair.<sup>8</sup>

For our nuclear-case scenario, we assume the use of perhaps crude nuclear devices in urban areas. Although the blast and radiation effects of such weapons are highly speculative, rough computations by RAND staff for internal discussion purposes suggest that even a subkiloton-yield explosive in a high-density urban area could cause tens of thousands of deaths—the same rough order as the 20-kiloton blast over Nagasaki.<sup>9</sup> Accordingly, let us assume casualties under this nuclear case at 50,000 deaths and 300,000 injuries annually. Table 3.5 summarizes the casualty assumptions under the three cases.

While certainly subject to considerable disagreement as to likelihood and other parameters, perhaps in particular for the severe- and nuclear-case assumptions, the parameters (or bounds) in Table 3.5 may yield crude insights into the social value of counterterrorism efforts.<sup>10</sup> A review<sup>11</sup> of the literature on the statistical

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<sup>6</sup>See [www.mothra.rerf.or.jp/ENG/A-bomb/History/Damages.html](http://www.mothra.rerf.or.jp/ENG/A-bomb/History/Damages.html).

<sup>7</sup>See [www.csi.ad.jp/suzuhari-es/1000cranes/nagasaki/index.html](http://www.csi.ad.jp/suzuhari-es/1000cranes/nagasaki/index.html).

<sup>8</sup>See [www.milnet.com/milnet/nukeweap/hiroshima/hiroshima.htm](http://www.milnet.com/milnet/nukeweap/hiroshima/hiroshima.htm).

<sup>9</sup>This is discussed in an informal internal discussion memorandum by Calvin Shipbaugh of RAND, “Urban Attack Scenario Calculation,” December 16, 2002. The calculations are in the “back-of-an-envelope” tradition but offer useful insights for order-of-magnitude analytic purposes. Biological weaponry might yield casualties similar to those resulting from nuclear weaponry, but those effects are somewhat more speculative, in that the casualty numbers would depend on such parameters as reinfection rates and the like.

<sup>10</sup>As might be expected, there is considerable disagreement on the likely efficacy of terrorist attacks on nuclear-power plants, the use of “dirty” nuclear bombs or bioterrorism weaponry, and the like. See, for example, Centers for Disease Control and Prevention, *Vaccinia (Smallpox) Vaccine Recommendations of the Advisory Committee on Immunization Practices (ACIP)*, 2001, Atlanta, GA, June 22, 2001; Jonathan B. Tucker, *Scourge: The Once and Future Threat of Smallpox*, New York: Atlantic Monthly Press, 2001; Gerald E. Marsh and George S. Stanford, *Terrorism and Nuclear Power: What Are*

**Table 3.5**  
**Annual Moderate-, Severe-, and Nuclear-**  
**Case Casualties**

Case	Deaths	Injuries
Moderate	1,175	8,700
Severe	15,500	114,500
Nuclear	50,000	300,000

SOURCE: Author's computations.

value of changes in labor market risks to life finds a mean value (among 23 studies) of approximately \$6 million in year 2001 dollars; outside the labor market, the mean figure reported among seven studies is lower, at approximately \$2 million. That latter figure is consistent with an estimate reported in a recent paper analyzing mandated speed limits, at about \$1.3 million.<sup>12</sup> It may be reasonable, therefore, to assume—again, for purposes of crude analysis—a figure of, say, \$4 million per life.<sup>13</sup> With respect to injuries, Viscusi<sup>14</sup> summarizes findings in 17 studies; the mean value is approximately \$40,000.

If we use these numbers—admittedly crude—we can estimate for each of our three cases the annual value of deaths and injuries, as shown in Table 3.6. The midpoint of the range is \$100–\$110 billion.

## Physical Damage

Data on the physical damage caused by terrorist attacks seem to be unavailable on a systematic basis. A paper published shortly after the September 11, 2001

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*the Risks?* Washington, DC: National Center for Public Policy Research, November 2001; and Guy Gugliotta, "Technology of 'Dirty Bomb' Simple, but Not the Execution," *Washington Post*, December 5, 2001.

<sup>11</sup>W. Kip Viscusi, "The Value of Risks to Life and Health," *Journal of Economic Literature*, Vol. 31, December 1993, pp. 1912–1946.

<sup>12</sup>Orley Ashenfelter and Michael Greenstone, *Using Mandated Speed Limits to Measure the Value of a Statistical Life*, National Bureau of Economic Research, Working Paper 9094, August 2002.

<sup>13</sup>The phrase "value of life" is a bit cavalier given that the concept is both profound and difficult, and it is somewhat misleading conceptually. Such estimates are derived from market behavior in the context of marginal (i.e., small) changes in perceived risks and other parameters, so that what actually is being measured is the value of changes in the number of years of life expectancy, a concept somewhat different than the amount that individuals would be willing to pay not to be killed.

<sup>14</sup>Viscusi, 1993.

**Table 3.6**  
**Annual Value of Deaths and Injuries, Three Cases**  
**(billion 2001 dollars)**

Case	Deaths	Injuries	Total
Moderate	4.7	0.3	5.0
Severe	62.0	4.6	66.6
Nuclear	200.0	12.0	212.0

SOURCE: Author's computations.

attacks offers an estimate of \$10–\$13 billion in property damage caused by the attacks, but that estimate is problematic.<sup>15</sup> The physical damage likely to result from future terrorist attacks obviously will depend upon the nature of the attacks—bombings are more damaging to physical structures than, say, shootings, but even undamaged property is likely to lose considerable economic value if the perceived risk of terrorist attacks at a given site (or class of sites) increases. The latter class of loss, strictly speaking, lies more in the category of “structural economic shift” than “property damage.” At the same time, the Navarro/Spencer paper estimates the value of human life lost September 11 to be “in the range of \$40 billion,” but it does not provide an estimate of the value of the injuries. Roughly, the authors’ property damage estimate is some 25–30 percent of that for deaths. Note that the paper uses an assumed death toll of 6,000, whereas more recent reports have estimated the number of deaths at somewhat above 3,000, which would increase the ratio of physical damage to the human toll accordingly.<sup>16</sup>

Alternatively, consider an airliner with, say, 100 passengers and crew<sup>17</sup> destroyed by terrorists; if we value the lives at \$4 million (as above), or \$400 million in total, and if the airliner is worth about \$100 million, then the ratio works out to about 25 percent, with additional property damage possible on the ground. Although the plane might be used deliberately to destroy lives and property on the ground, as on September 11, there is no reason to predict that the ratio would be affected systematically one way or the other.<sup>18</sup> The effect of government policies and private efforts designed to interfere with the ability of terrorists to undertake particular classes of attacks (or to protect particular

<sup>15</sup>Peter Navarro and Aron Spencer, “Assessing the Costs of Terrorism,” *Milken Institute Review*, Fourth Quarter 2001, pp. 17–31. Some components of the estimate are guesswork (as the authors acknowledge), and other components are based upon the replacement cost of assets rather than their market values. The authors do not claim that their estimates are rigorous.

<sup>16</sup>Gary Becker and Kevin Murphy offer a rough estimate of \$25–\$60 billion as the economic loss caused by the September 11 attacks. “Prosperity Will Rise Out of the Ashes,” *Wall Street Journal*, October 29, 2001.

<sup>17</sup>On September 11, 266 people were killed on the four aircraft.

<sup>18</sup>The types of targets likely to further the political or other goals of terrorist groups, while crucial, is a topic beyond our scope here.

classes of potential targets, such as people) might shape the nature of future attacks. For example, property damage might be increased relative to deaths and injuries, or both reduced, if denying terrorist groups their preferred targets has a substitution effect of shifting their attention to different targets. Denying targets could also have an “income” effect, perhaps reducing attacks in the aggregate if they were “worth” less to the terrorists.

In 2001, U.S. national income was about \$8.1 trillion,<sup>19</sup> of which, interestingly enough, some 81 percent was composed of employee compensation and the incomes of proprietors. Such income, as a crude approximation, represents payments to human capital, with most of the remainder representing payments to land and to physical and financial capital.<sup>20</sup> As a first approximation, we might assume that terrorist attacks would destroy people and property proportionately, so that property damage would be about 20–25 percent of the toll from deaths and injuries.<sup>21</sup> If we assume the ratio to be 25 percent, our estimate of \$5–\$212 billion (from Table 3.6) would rise to about \$6.3 billion per year for the moderate case, \$83.3 billion per year for the severe case, and \$265 billion per year for the nuclear case. Becker and Murphy imply a roughly comparable ratio of 43 percent, noting numbers of \$30 trillion in U.S. physical assets and \$100 trillion in total productive assets including human capital.<sup>22</sup>

## GDP Effects

Apart from the direct human and physical destruction wrought by terrorist acts, there are other important economic effects. An increase in the risk premium demanded by capital markets is likely, particularly for the kinds of investments (or geographic areas) perceived to be disproportionately at risk. That shift would tend to raise real interest rates, but the increase in perceived risks (again, perhaps for particular sectors or places) would reduce the demand for investment, placing downward pressure on real interest rates; the net effect upon real interest rates is unclear *ex ante*, but the downward effect on aggregate

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<sup>19</sup>Council of Economic Advisers, *Economic Indicators*, July 2002, p. 4. National income is employee compensation, income for farm and nonfarm proprietors, rental income, corporate profits, and net interest.

<sup>20</sup>Proprietor income includes returns to capital, but because proprietor income is less than 10 percent of total national income, this complication is unlikely to significantly affect the crude estimates discussed here.

<sup>21</sup>Obviously, this would not be true for attacks on empty buildings or on the busy Washington Mall on the night of July 4, but it does not seem unreasonable on average as a crude planning assumption.

<sup>22</sup>See Becker and Murphy, 2001.

investment is clear.<sup>23</sup> The reduction in the long-run capital stock would reduce wages, and the reduction in the demand for dollar-denominated assets would weaken the dollar, other things equal.<sup>24</sup> Both effects imply a reduction in national wealth, and thus a one-time increase in the general price level.<sup>25</sup> Both the term structure of interest rates and interest rate spreads among different classes of assets would be affected, with returns on safer assets falling relative to those on riskier ones. The prospective effect on the slope of the yield curve is unclear *ex ante*, in that counterterrorism measures implemented over time might reduce longer-term risks relative to shorter-term ones. At the same time, it is not unreasonable to assume that such a catastrophic attack as that suffered on September 11, 2001 might increase the perceived riskiness of the more-distant future relative to that of the short term.

Because the increased threat is not uniform either geographically or by economic sector, relative prices are likely to be affected, engendering shifts of resources, including labor, among sectors and geographic regions. Increased consumption of security services across the economy, in both the private and public sectors, which would mean reduced consumption in other sectors, is only one obvious example.<sup>26</sup> Such shifts are not frictionless, particularly given the need for workers and businesses to gather information about their best opportunities in the new environment, and so a period of increased unemployment would ensue. Consumer confidence would be likely to fall, and with it domestic final purchases; however, government purchases for emergency aid and national security initiatives, along with private- and public-sector spending for rebuilding efforts, would offset some of that effect.

Some such effects would be temporary in the sense that a one-time attack might change perceived economic conditions for a time, after which “normalcy” would return; an example might be automobile purchases delayed because of reduced

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<sup>23</sup>The terrorist threat, therefore, is analogous to a (quasi) lump-sum tax imposed disproportionately upon particular sectors and/or geographic areas. One might assume reasonably that the insurance/reinsurance market functions well, so that such “small” risks as those posed, say, by potential car bombings are diversified broadly. Even if such insurance is “perfect”—no individual faces more uncertainty than before the emergence of the terrorist threat—the risk premium for particular types of investments must rise. For those sectors or geographic areas, investment will fall, and some part of the investment demand will shift to other sectors or geographic areas, where asset prices will rise and rates of return (real interest rates) thus will fall.

<sup>24</sup>The latter effect assumes that U.S. interests become a disproportionate target. Even if the United States were not a disproportionate target of an intensified terrorist threat, the worldwide demand for investment can be predicted to fall.

<sup>25</sup>This is not the same as an increase in inflation, which is an increase in the rate at which the price level rises over time.

<sup>26</sup>Increased resource consumption for security can be implicit, as, for example, with substitution of highway travel for air travel, inconvenience and delay at airports, and so forth. Becker and Murphy (2001) offer a rough estimate of \$10 billion per year for the cost of increased airport security and passenger delays.

confidence. Such economic losses, therefore, would represent intertemporal shifts. That perspective is revealed in several forecasting exercises for the U.S. economy, which predict a temporary reduction in U.S. gross domestic product (GDP) growth—typically by about 0.5–1.0 percentage points—for two to five quarters as a result of the September 11 attacks.<sup>27</sup> This is roughly consistent with the more qualitative discussion in the Council of Economic Advisers' *Annual Report*, February 2002, chapter 1.

The Israel Ministry of Finance estimates that the increased terrorist activity during 2001 reduced GDP growth by about 1 percentage point.<sup>28</sup> That effect may be high for U.S. planning purposes because the U.S. economy is far larger and more diversified; on the other hand, it may be low in the sense that standard GDP measures exclude important parameters not valued (priced) easily in markets. The disruptions and other adverse effects of an Israel-type condition applied in the U.S. context would be likely to have effects larger than only 1 percent of GDP, a magnitude not greatly bigger than the errors introduced by data problems and the like, as reflected in the quarterly estimated GDP revisions published by the U.S. Bureau of Economic Analysis. At the same time, the economic cost of dealing with a given terrorist threat may decline over time, as economic adjustments are made and more efficient responses are developed; in this context, the emergence of a terrorist threat can be viewed as imposing a “one-time” penalty upon national wealth, with “normal” growth resuming at a lower level. On the other hand, the terrorist threat is likely to evolve in response to U.S. counterterrorism efforts (and vice versa) and perhaps in response to changes in international political conditions and other parameters. For discussion purposes, therefore, let us assume that a terrorist threat condition analogous to our moderate case would reduce U.S. GDP by 0.05 percent, that the GDP effect of our severe case would be 1 percent, and that the GDP effect of our nuclear case would be 2 percent.<sup>29</sup> Table 3.7 summarizes the annual direct economic costs discussed thus far.

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<sup>27</sup>An example is the series of “Economic and Financial Perspectives” and “Economic Brief” discussions published by the Economic Research section of Banc of America Securities (NationsBank), written by Mickey D. Levy, a prominent financial-sector economist. See *The Shape of Economic Recovery* (September 5, 2001), *The U.S. Economy After the Attack* (September 14, 2001), *Economic Performance and Policy Following the Terrorist Attacks* (October 15, 2001), *2002: Economic Recovery but Questions Linger* (December 14, 2001), and *Critical Current Issues Facing Financial Markets in 2002* (January 2, 2002).

<sup>28</sup>Israel Ministry of Finance, *The Israeli Economy at a Glance*, 2001, <http://www.mof.gov.il/prospectus02/mainpage.htm>.

<sup>29</sup>Becker and Murphy (2001) offer a rough estimate of 0.3 percent attendant upon an annual loss of \$25 billion caused by terrorist attacks. For our moderate case, we assume a number (0.05 percent of GDP) that is “small,” under the assumption that it would not be close to zero. For our severe case, we assume a number (1 percent of GDP) analogous to the reported Israeli effect. For our nuclear case, we assume a number (2 percent of GDP) that is “large,” but that arguably is too conservative in

**Table 3.7**  
**Annual Direct Economic Costs**  
**(billion 2001 dollars)**

Case	Deaths, Injuries	Property Damage	Reduced GDP	Total
Moderate	5.0	1.3	5.0	11.3
Severe	66.6	16.7	100.0	183.3
Nuclear	212.0	53.0	200.0	465.0

NOTE: Reduced GDP is based upon an assumed GDP of \$10 trillion.

## Increased Government Spending

Government spending for defense, security activities, and other purposes has increased as a result of the September 11 attacks, and such increased expenditures can be expected to be permanent assuming a long-term war against terrorism and the institutional incentives created when programs are created or expanded.<sup>30</sup> In the immediate aftermath of the September 11 attacks, the federal government appropriated \$40 billion for reconstruction and humanitarian efforts, industry aid, and other purposes. The fiscal year 2002 defense budget has been increased by \$20 billion for military operations and recovery efforts, and future defense budgets are likely to increase at least by similar amounts for procurement and other functions substantially (but not entirely) related to counterterrorism efforts. Moreover, domestic security functions pursued by the federal government are certain to increase, with projections of additional annual spending of \$35 billion or more.<sup>31</sup>

There is the further matter that counterterrorism activities to a substantial degree are collective goods as defined above, in that they accrue to the benefit of the society generally but to no specific individual in particular; although, again, different individuals may value collective efforts differently, and such efforts may not increase protection uniformly among individuals, geographic regions, or economic sectors.<sup>32</sup> Just as standard economic theory predicts that the private

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that an annual nuclear explosion in the United States presumably would have considerable aggregate economic effects.

<sup>30</sup>See, for example, Thomas E. Borchering (ed.), *Budgets and Bureaucrats*, Durham, NC: Duke University Press, 1977; and Robert Higgs, *Crisis, Bigger Government, and Ideological Change: Two Hypotheses on the Ratchet Phenomenon*, monograph, Oakland, CA: Independent Institute, 2001.

<sup>31</sup>Associated Press, "Bush Signs Defense Spending Bill," *New York Times*, January 11, 2002; James Dao, "Pentagon Seeking a Large Increase in Its Next Budget," *New York Times*, January 7, 2002; Eric Pianin and Bill Miller, "Bush's Budget to Include Big Security Boost," *Washington Post*, December 22, 2001; and Bradley Graham, "Bush Plans to Seek \$14 Billion Hike in Defense Budget," *Washington Post*, December 15, 2002.

<sup>32</sup>For example, efforts to improve airport security clearly accrue to the benefit of identifiable passengers and airlines. This is merely to say that counterterrorism efforts are not a pure collective

sector provides collective goods at a level lower than economically efficient socially, because of the well-known free-rider problem, modern public-choice analysis predicts that government as well under majority rule provides too few collective goods (and too many transfer payments). This outcome results because the political majority—half the voters in the simple case in a large community—can impose taxes upon all citizens and then vote to give itself two dollars of transfer payments (per member of the majority) for every dollar (per voter) of the collective good forgone.<sup>33</sup>

One way to circumvent this problem is to transform the collective good into a (quasi-) private good benefiting the majority. The standard process under democratic institutions has been to tie subsidies for specific interests to funding proposals for the collective good.<sup>34</sup> Thus, the counterterrorism effort in Congress engendered by the September 11 attacks has been characterized by a prominent series of actions to tie special-interest legislation to defense, homeland security, and other such spending. Examples include a variety of subsidy programs for airlines, insurers, farmers, the tourist industry, manufacturers of small aircraft, operators of small airports, the City and the State of New York, education, and various projects in West Virginia.<sup>35</sup> Efforts to apply traditional civil service protections to federal security workers are another instance. Nor does such linkage have to be explicit; support for collective activities can be traded for support for seemingly unrelated legislation containing funding for various kinds of transfers. One additional source of government spending (and, more broadly, resource consumption) in the context of U.S. counterterrorism efforts, therefore, is the likely need to tie special-interest subsidies to those efforts for purposes of generating sufficient political support. Ironically, this factor may make some level of “pork” (such subsidies) efficient if the additional counterterrorism effort obtained is sufficiently valuable socially.

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good. Moreover, public-sector provision of counterterrorism efforts may prove efficient for additional economies of scale and scope.

<sup>33</sup>See, for example, James M. Buchanan, *Public Finance in Democratic Process*, Chapel Hill, NC: University of North Carolina Press, 1967, especially Chap 9. If we define units of the collective and private goods as a real dollar’s worth per voter or per member of the majority coalition, the majority reduces social consumption of the collective good in favor of transfers until one dollar of the former has the same marginal value (to the median voter) as two dollars of the latter.

<sup>34</sup>Consider, for example, the effect of placing “inefficient” defense bases in many congressional districts: It is not unreasonable to hypothesize that doing so increases long-term political support for defense spending, and so may be an efficient response to the central incentive under democratic institutions to spend too little on defense to the extent that it is a collective good. Accordingly, an assumption that closing “unnecessary” bases might allow for substantially increased funding of other defense activities may be optimistic.

<sup>35</sup>See John Lancaster and Dan Morgan, “In Congress, Pork Stays on Menu,” *Washington Post*, November 15, 2001; Carolyn Lochhead, “Congress Slips Extras into War Spending,” *San Francisco Chronicle*, November 18, 2001; Sharon Theimer, “Lobbyists Tout Plans as Anti-Terror,” Associated Press, November 26, 2001; and Robert Pear, “Lobby Groups Find Congress in Giving Mood,” *New York Times*, December 18, 2001.

As an aside, there is another source of the possible efficiency of such special-interest spending—because the United States is a common-currency area, the economy cannot adjust to such structural economic shifts as those discussed above in part through adjustments in exchange rates. Instead, adjustments must be made through changes in relative prices and attendant reallocation of real resources, including labor. Such special-interest spending as disaster relief, long-term economic assistance, and the like may be an efficient vehicle with which to smooth such adjustments and reduce pressures for inflation or other responses imposing possibly large economic costs.<sup>36</sup>

Accordingly, the ongoing and future counterterrorism effort is likely to include subsidies. The distinction between such subsidies and the provision of the counterterrorism collective good is not always sharp, and, obviously, subsidy programs are important even in the absence of a counterterrorism war. To avoid double counting, let us assume that the \$40 billion noted above is special-interest spending, with the remaining \$55 billion directly related to the counterterrorism effort, all on an annual basis.<sup>37</sup> These numbers apply to the effects attendant upon the September 11 attacks rather than the hypothetical severe-case scenario described above, but public-sector resource consumption, if anything, would be likely to exceed these numbers in the latter case.

This \$95 billion in increased spending itself is the direct public-sector cost of the effort. The government must obtain such resources, whether now or in the future, through the tax system (or through such implicit taxation as inflation), which imposes indirect costs upon the economy in the form of resource misallocation. In other words, the private sector must give up more than a dollar to transfer a dollar to the government. A substantial body of empirical work has examined this question, with findings on the marginal cost of government spending ranging from about \$1.50 to over \$5.00.<sup>38</sup> Let us assume, to be

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<sup>36</sup>Changes in land prices also would facilitate adjustment to new economic conditions, but because the need for real resource shifts must stem from various kinds of price rigidity, it is unlikely that changes in land prices can solve the adjustment problem. There does not seem to be an *ex ante* reason to believe that land prices systematically are more flexible than others.

<sup>37</sup>See the discussion above: \$40 billion for reconstruction and humanitarian efforts, \$20 billion for increased defense efforts, and \$35 billion for domestic security functions. The past military operations in Afghanistan for the most part are included in those figures, but the prospective costs of military action and the ensuing occupation/reconstruction effort in Iraq—which are highly uncertain—are not.

<sup>38</sup>If, say, the marginal cost were estimated at \$3.00, the private sector must send \$1.00 to the government, and must give up another \$2.00 in order to do so, so that the marginal deadweight loss of government spending would be \$2.00. See, for example, Martin Feldstein and Daniel Feenberg, *The Effect of Increased Tax Rates on Taxable Income and Economic Efficiency: A Preliminary Analysis of the 1993 Tax Rate Increases*, National Bureau of Economic Research, Working Paper 5370, November 1995; Martin Feldstein, *Tax Avoidance and the Deadweight Loss of the Income Tax*, National Bureau of Economic Research, Working Paper 5055, 1995; J. A. Kay, "Tax Policy: A Survey," *The Economic Journal*, 1990; and unpublished estimates by William A. Niskanen (private correspondence). One

conservative, that the marginal cost is \$2.00, so that the assumed annual spending increase of \$95 billion for counterterrorism efforts imposes a total economic cost annually of \$190 billion.

States and localities clearly have and will contribute to the security effort; a recent survey by the National Governors Association concludes that state security spending for the first year in the wake of September 11 will be about \$4 billion.<sup>39</sup> It is unclear whether local spending is included. The California state security adviser has announced that state and local governments have spent about \$142 million, with an additional \$420 million projected through 2002.<sup>40</sup> Let us assume an annual state and local expenditure of \$5 billion—as with the federal case just discussed, our severe and nuclear cases would be likely to engender larger numbers than those now observed. Let us assume as well that the marginal deadweight losses imposed by state/local revenue instruments to be \$1 billion.<sup>41</sup> Accordingly, our estimate of government spending and related costs is \$196 billion annually.

That figure is a rough measure of the response to the September 11, 2001 attacks. Particularly with respect to the reconstruction and humanitarian efforts, it is largely an outcome of the nature and magnitude of the attacks themselves. At the same time, the magnitudes of important components of a national counterterrorism effort are somewhat independent of the prospective size of future attacks, in that efforts to prevent, say, a severe-case scenario also will serve to prevent the nuclear-case scenario to some substantial degree, and vice versa.<sup>42</sup> Presumably, our moderate case would not elicit such an effort and consumption of resources, while our nuclear case would engender a true national mobilization of some sort, with costs accordingly even higher. For discussion purposes, therefore, let us assume respective counterterrorism costs for our moderate, severe, and nuclear cases of \$10 billion, \$200 billion, and \$300 billion. Table 3.8 summarizes these figures.

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problem sometimes encountered in this literature is a failure to distinguish clearly between short- and long-term effects; the marginal cost of government spending is higher in the long run than in the short run.

<sup>39</sup>National Governors Association Center for Best Practices, *Cost of Homeland Security*, Washington, DC, December 5, 2001. See also Alison Mitchell, "Ridge Promises Security Funds for States in Next U.S. Budget," *New York Times*, December 7, 2001.

<sup>40</sup>Don Thompson, "Gov. Davis Wants Federal Reimbursement," Associated Press, January 8, 2002.

<sup>41</sup>Deadweight losses are smaller at the state and local level than at the federal level because tax competition yields substantially lower marginal tax rates for the smaller governmental units.

<sup>42</sup>At the same time, the specific features of efforts to counter the severe- and nuclear-case threats would differ simply because of underlying differences in the threats themselves, so that the respective counterterrorism costs would differ as well.

**Table 3.8**  
**Annual Economic Costs of Terrorist Attacks and Counterterrorism Efforts**  
**(billion 2001 dollars)**

Case	Deaths, Injuries/Property Damage/Reduced GDP	Counter- terrorism	Total
Moderate	11.3	10.0	21.3
Severe	183.3	200.0	383.3
Nuclear	465.0	300.0	765.0

## 4. Comparing Benefits and Costs

### The Long Run

The counterterrorism cost figures in Table 3.8 ignore the effectiveness of the effort in reducing future economic costs caused by terrorism. The assumption made above, for example, that the recent Israeli experience provides a severe case for analytic purposes suggests implicitly that those adverse effects are observed even given a substantial defensive effort, although, as might be imagined, there exists heated debate over the design, implementation, and effectiveness of the Israeli counterterrorism effort. However, it is reasonable to assume that it must have had some salutary defensive effects.

The pursuit of “efficiency” in national counterterrorism policy would seek to find a rough equivalence in the marginal costs and benefits of counterterrorism efforts. In the long run, beginning with the attacks of September 11, decisions have to be made about the magnitude and specifics of the aggregate resources to be acquired and deployed in light of the perceived aggregate threat. One very crude approach is to assume that the total benefits and costs estimated above—\$11.3–\$465 billion and \$10–\$300 billion, respectively—are roughly correct. In that case, because total cost does not obviously exceed total benefit, it is at least possible that marginal cost does not exceed marginal benefit, so that we are not spending “too much.”<sup>1</sup>

This is particularly the case if long-run investment in counterterrorism is “lumpy,” that is, if large organizations, manpower forces, and stocks of capital must be organized and acquired at the outset to be effective. Furthermore, this ignores the benefit of risk reduction for a population that reasonably can be assumed to be averse to extreme risks in the terrorism context. Such risk reduction under these conditions might have significant value. In the absence of the defensive effort, the costs imposed by terrorist acts presumably would be (far) greater, but that assumes that the effort is effective to some substantial degree. Moreover, such salutary effects of a serious counterterrorism policy as

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<sup>1</sup>In other words, if total cost clearly were greater than total benefit, it would be reasonable to assume that marginal cost would exceed marginal benefit under reasonable assumptions, in that marginal cost is likely to rise as the counterterrorism effort expands, and marginal benefit is likely to decline.

enhanced national pride may be nonquantifiable, but nonetheless they are likely to be important in the sense that the citizenry may be willing to pay nontrivial amounts to achieve them. They may be offset by losses in civil liberties, but unless the counterterrorism efforts are highly ineffective, there is no clear *ex ante* reason to believe that political processes systematically will yield the wrong tradeoff in the security/liberty context. This issue, however, is worthy of more analytic attention.

## The Short Run

In the short run, efficiency requires equality of marginal costs and benefits; those parameters are quite difficult to measure, in that a “unit” of counterterrorism effort is elusive to define. In addition, as noted above, much of the counterterrorism effort is undertaken at the outset, that is, fixed, in order to develop physical and human capital and an organizational structure that then can be deployed to counter specific types and classes of threats. In this sense, counterterrorism is analogous to ordinary domestic anticrime efforts by local police agencies, which are deployed in anticipation of a perceived problem and which are then used to prevent and respond to given crimes. To a substantial degree in this context, the short-run marginal cost of preventing a given crime or apprehending a given criminal is close to zero, in that police resources once deployed can be viewed as fixed assets, the costs of which are borne regardless of whether a given marginal crime is averted. Accordingly—as a first approximation—it is reasonable to argue that the short-run marginal cost of counterterrorism efforts is close to zero, in that once the personnel, equipment, and systems are in place, prevention of an attack adds little or nothing to total cost, except in the sense that resources allocated to preventing it cannot be used (or used as effectively) to prevent other attacks.

On the benefit side, a prospective “unit” of terrorism is somewhat easier to define, in that a bombing or other hostile act prevented can be defined and rough parameters in terms of lives and property saved and the like assumed.<sup>2</sup> One useful way to approach this problem is to think of “units” of terrorism in terms of “bombing equivalents.” Consider again the recent Israeli experience: For the period November 2, 2000 through August 5, 2002, there were 73 bombings directed at Israeli targets in the West Bank, Gaza Strip, and Israel, as defined

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<sup>2</sup>See Associated Press, “FBI Director: 100 Terror Attacks Thwarted,” December 16, 2002. FBI Director Robert Mueller is quoted as follows: “There have been any number of attacks on ships that have been thwarted . . . both large and small.” He argues in addition that some attacks intended for U.S. soil also have been prevented. See also Richard A. Serrano and Greg Miller, “100 Terrorist Attacks Thwarted, U.S. Says,” *Los Angeles Times*, January 11, 2003.

within the pre-1967 boundaries. These caused 296 deaths and 2,687 injuries, or an average of some 4 deaths and 37 injuries per bombing.<sup>3</sup> Using the assumptions outlined above on the economic value of life (lost years), injuries, and attendant property damage, the marginal benefit of an average bombing equivalent prevented is about \$21.9 million.<sup>4</sup> Recent official statements claim that the recent and ongoing U.S. counterterrorism effort has averted 100 attacks; if true, that benefit would be “worth” about \$2.2 billion as narrowly defined in our simple analytic model. In addition, it is reasonable to assume that the counterterrorism effort yields a reduction not only in the number of successful attacks but also in the number of attacks undertaken, planned, or even conceived. It is difficult to know, however, whether any of the attacks prevented would have fallen into the nuclear category, in which case the marginal benefits might be far higher; and some of the spending is likely to create counterterrorism “capital” that might yield important benefits in the future.

It is difficult as well to know without information that is likely to be highly classified which “units” (i.e., resources) of the counterterrorism effort are responsible for given successes, or for the fact that a substantial part of al Qaeda has been destroyed, the Taliban is out of power and perhaps nonexistent, the Iraqi regime soon may be overthrown, and greater hesitancy to support terrorist groups can be assumed on the part of the Iranian, Pakistani, Syrian, and other regimes as a result of recent U.S. policies. More generally, because the adverse effects of terrorist attacks are highly visible and are likely to impose significant political costs upon current policymakers, it is not difficult to assume that counterterrorism efforts are likely to be designed, or to evolve, in ways yielding some nontrivial degree of effectiveness.

Accordingly, it appears at a very rough level that short-run marginal cost is low or zero, whereas short-run marginal benefit is moderate or high. This suggests that the U.S. counterterrorism effort, if anything, may be too small. This topic merits greater attention.

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<sup>3</sup>Israel Ministry of Foreign Affairs at [www.mfa.gov.il/mfa.go.asp?MFAH0i5d0](http://www.mfa.gov.il/mfa.go.asp?MFAH0i5d0).

<sup>4</sup>However, see footnote on value of life in Section 3.

## 5. Some Public Finance Issues

### Federal Versus State and Local Finance

The division of responsibilities among levels of government is, relatively speaking, among the more straightforward issues arising out of the September 11 attacks. Most attention has been focused upon military, intelligence, diplomatic, and other overseas activities that for the most part are undertaken appropriately at the federal level. Many domestic activities have effects that are felt across states or regions, and it may be that such activities could be organized more efficiently at the federal level, rather than, say, through (perhaps *ad hoc*) cooperative efforts among various combinations of state and local governments. At the same time, it is not obvious that coordination of efforts requires a centralized decisionmaking process in all cases. Just as market forces can yield coordination without centralization, it is likely that states and localities, observing federal efforts and surveying their own needs, might choose actions designed to fill in the gaps left by the inability of the federal government to do everything worth doing.

Indeed, most policing and other public-safety functions historically have been organized at the state and local levels, and in the context of the national counterterrorism effort, many such protection and policing functions undoubtedly will continue to be undertaken by states and localities. Some examples may be security for schools, regional airports, bridges, and the like. The question may then be asked whether it is more appropriate for state and local or the federal government to finance such efforts, or perhaps more narrowly, whether federal financial aid to states and localities is likely to be efficient. One prominent public official argued recently that “Washington is the only entity with the ability to raise the resources our new situation requires.”<sup>1</sup>

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<sup>1</sup>See Charles E. Schumer, “Big Government Looks Better Now,” *Washington Post*, December 11, 2001. See also Andrew LaMar, “Davis to Lobby Washington to Help Pay for State Efforts,” *Contra Costa Times*, December 12, 2001; Thompson (2002); and Mitchell (2001). This financing issue is separate from the problem of allocating federal resources in the context of a new, larger war against terrorism—an inquiry that might examine the relative benefits and costs of the federal pursuit of such interstate crimes as carjacking, marijuana offenses, gender-based family/domestic violence, and child-support arrears.

That raises the issue of whether the federal government is in some sense “wealthier” than the states and localities taken collectively. It would seem at first glance that because all governmental units must obtain resources from the private sector (or from the taxpayers for most purposes), the federal government in truth does not have a greater ability than states and localities collectively to marshal resources.

On the other hand, unlike states and localities, the federal government can acquire resources by inflating the currency, it may borrow to finance current consumption rather than investment, and it has more monopoly taxing power than do states and localities individually, in that individuals and businesses must find it more costly and difficult to move among nations than among localities and states.<sup>2</sup> The abilities to inflate and to exercise monopoly power over the taxpayers are poor arguments for a federalization of public-sector counterterrorism financial needs, in that neither greater inflation nor higher tax rates are likely to align the benefits and costs of counterterrorism public policies more closely.<sup>3</sup> Nor is it clear, at a minimum, that the use of inflation or the exploitation of federal monopoly power would reduce the economic costs of public-sector resource acquisition, as discussed above. At the same time, the collective nature of the counterterrorism effort from the national standpoint makes a dominant federal effort reasonable, particularly in the military and intelligence dimensions, but that is not a relative governmental “wealth” rationale.

The ability to borrow for current consumption is more relevant. At the state and local level for the most part, bonded indebtedness is reserved for the acquisition of such physical capital assets as schools, prisons, and water projects; this constraint imposes fiscal discipline upon current voters, who otherwise could finance current consumption with debt, leaving future residents of the respective states to service and retire the debt.<sup>4</sup> Given the relative ease in the United States of relocating among states and localities, such use of debt might yield unsupportable future state and local debt burdens, and thus current unwillingness (or demands for higher interest rates) on the part of the capital

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<sup>2</sup>To the extent that it is anticipated, inflation is a tax on fiat money, the effect of which is to reduce the real purchasing power of moneyholders, thus releasing real resources to the government. To the extent that inflation is unanticipated, it transfers wealth from net monetary creditors to net monetary debtors; the government is almost always a major example of the latter. With respect to the relative monopoly power of the federal government, the higher marginal tax rates observed at the federal level as opposed to the state level are one central manifestation.

<sup>3</sup>See Geoffrey Brennan and James M. Buchanan, *The Power to Tax: Analytic Foundations of a Fiscal Constitution*, New York: Cambridge University Press, 1980.

<sup>4</sup>If the increased debt burden imposed upon future residents were reflected in land prices, the incidence of the debt might be forced back onto current voters.

market to lend. But the use of debt to finance the acquisition of capital assets producing future services poses no such problem, in that future taxpayers (presumably) will find the services worth the taxes needed for debt repayment.<sup>5</sup>

Counterterrorism efforts in the wake of September 11 can be viewed as investment in an improved security environment for the United States as a whole, even if some substantial part of the efforts do not create (physical) “capital” assets *per se*. Because the benefits for future generations of Americans flowing from these current efforts are clear (assuming that the efforts prove effective), it is appropriate to finance the latter with debt so that the future benefits of current counterterrorism policies are aligned with costs.<sup>6</sup> Implicitly, this is what federal policy has done, perhaps crudely, for many years: For example, the Reagan-era deficits coincided with a substantial increase in federal investment, particularly for military capital.<sup>7</sup> This shunts aside the issue of whether the capital investments were worth their cost, or in the current context, whether U.S. counterterrorism efforts are worth their cost. But given that Congress has and will decide that certain efforts are worth pursuing, debt is the appropriate vehicle with which to finance such efforts (at least in part) under the assumption that future generations will derive substantial benefits. Accordingly: To the extent that counterterrorism efforts are efficient to organize at the state and local levels, federal revenue transfers may be appropriate, particularly if the state and local efforts involve the protection of physical assets or other activities accruing to the benefit of other states and regions as well as to future voters, and if the states and localities are proscribed from borrowing for such activities.<sup>8</sup>

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<sup>5</sup>To estimate the federally financed capital stock, the Office of Management and Budget (OMB) includes spending on physical capital, research and development, and education and training. A counterterrorism war financed with debt, assuming that it is effective in some crude sense, would yield obvious benefits for future voters, but it would not be defined as “investment” in the OMB methodology except to the extent that the spending is used to acquire goods subsumed under those three categories.

<sup>6</sup>If current voters must pay for capital investments the benefits of which accrue (in part) to future voters, they may support through political processes too few such investments. Alternatively, if they are able to use debt to pay for services benefiting them, they may vote for too much, shifting the costs to future voters. This assumes that current voters do not increase saving and future bequests if government borrowing increases—that is, that the “Ricardian equivalence” argument does not hold. See Joseph G. Altonji, Fumio Hayashi, and Laurence Kotlikoff, *Parental Altruism and Inter Vivos Transfers: Theory and Evidence*, National Bureau of Economic Research, Working Paper 5378, December 1995. See also Robert Barro, “Are Government Bonds Net Wealth?” *Journal of Political Economy*, November/December 1974.

<sup>7</sup>The correspondence between the Reagan-era increases in the national debt and federal capital investments were surprisingly close. See Benjamin Zycher, “Debt, Defense, and Reaganomics,” *National Review*, December 14, 1992. See also Elisabeth Busmiller, “Bush Says He May Not Seek Balanced Budget This Year,” *New York Times*, January 8, 2002. This may be an example of the creation of a virtue out of necessity, but that does not mean that it is not a virtue.

<sup>8</sup>An example might be the protection of long-distance electric transmission lines. If federal revenue transfers are used to finance such state and local efforts, the form of the transfer can affect the level of resources that the recipients devote to the intended purposes. Three general classes of revenue transfers can be envisioned: general lump-sum transfers, targeted lump-sum transfers, and matching transfers. In general, matching transfers have the greatest impact upon recipient effort,

This has nothing to do with the greater purported “wealth” of the federal government, but any efficiency benefit must be weighed against the “cartelization” effect of revenue transfers from the federal level to lower units of government, which implicitly is a way to increase taxes above levels that would be observed if states and localities were forced to compete in the context of business and individual location choices.<sup>9</sup>

## Tax Earmarking

We noted above that the bias under democratic decision processes toward the public-sector production of private goods (transfers) means that efficiency in the collective defense effort may require the provision of interest-group subsidies greater than otherwise would be the case. This outcome obtains because most public-sector provision of such collective goods as defense is financed out of general revenues, which majorities in principle can use for any purpose.

An alternative approach would be the use of a tax base complementary with the benefits of counterterrorism efforts, with the attendant revenues earmarked for relevant purposes specified in advance. State highway trust funds are a good example of this fiscal institution. Gasoline taxes are imposed in rough proportion to highway use and are earmarked for highway purposes. If the owners of human and physical capital are the primary beneficiaries of the counterterrorism effort, then it may be appropriate to earmark some part of the revenues from income taxes on capital and labor into a counterterrorism “trust fund.” On the capital side, revenues from the corporation income tax may be a good candidate under some conditions, as the incidence of that tax is borne by the owners of all capital in the long run unless the capital is mobile internationally, in which case the tax would be shifted to the owners of relatively immobile factors of production.<sup>10</sup>

Unsurprisingly, such an approach (as others) suffers from problems. As with the Social Security “trust fund,” it may be difficult to enforce the constraint if earmarked revenues exceed earmarked expenditures in a given fiscal year.<sup>11</sup>

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whereas general and targeted transfers have smaller effects that are equal except under certain limited conditions, in which case the targeted transfers would have the greater effect.

<sup>9</sup>See Richard McKenzie and Robert Staaf, “Revenue Sharing and Monopoly Government,” *Public Choice*, 1978, pp. 93–97.

<sup>10</sup>See Arnold C. Harberger, *Taxation and Welfare*, Chicago: University of Chicago, 1978.

<sup>11</sup>No lockbox jokes, please. This problem in principle can be solved with statutory language requiring, say, that extra revenues be left in specified Treasury accounts or used to retire debt. However, statutory language can be changed quickly by a Congress seeking to spend the surplus earmarked revenues. Whether such a Constitutional fiscal constraint would be appropriate is beyond our scope here.

Activities eligible for financing under the counterterrorism trust fund will not define themselves, and there may be a tendency over time for additional programs to be categorized under the counterterrorism heading. On the other hand, an earmarking system, at least in principle, may provide clearer signals politically about the net benefits of the earmarked expenditure categories from the viewpoint of the taxpayers bearing the incidence of the earmarked tax instruments. And such a system might reduce the total cost of counterterrorism by reducing the political need for interest-group subsidies.

## Discount Rate for Public Investment

As the national counterterrorism effort continues over the foreseeable future, choices will have to be made among alternative goals and among instruments with which to achieve them, and, in principle, the aggregate size of the counterterrorism effort will have to be decided.<sup>12</sup> Comparison of alternatives will require the use of an appropriate discount rate at which to evaluate the future benefits and costs of public investments. The large literature on this topic is not repeated here. In brief, government resource use should reflect the best forgone opportunity in the private sector. Because of the corporation income tax, the marginal return in principle is in the corporate sector,<sup>13</sup> although government investment is not likely to be derived solely from that sector. Accordingly, the appropriate rate is the weighted marginal market rate of interest adjusted for distortions in the capital market.<sup>14</sup> The estimates in the literature for the most part fall in the range of 7 to 10 percent; a recent paper using revised national income accounts and capital stock data reports an estimate of about 8.5 percent.<sup>15</sup>

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<sup>12</sup>This aggregate size in practice is more likely simply to be the *ex post* sum of the component efforts.

<sup>13</sup>The (expected) before-tax rate of return in the corporate sector must increase so as to yield a competitive after-tax return.

<sup>14</sup>See Arnold C. Harberger, *Project Evaluation: Collected Papers*, Chicago: University of Chicago, 1972; James P. Quirk and Katsuaki Terasawa, *The Choice of Discount Rate Applicable to Government Resource Use*, Santa Monica, CA: RAND, R-3464-PA&E, December 1987; Arnold C. Harberger, "Three Basic Postulates for Applied Welfare Economics: An Interpretative Essay," *Journal of Economic Literature*, September 1971; Jack Hirshleifer and David L. Shapiro, "The Treatment of Risk and Uncertainty," in Robert Haveman and Julius Margolis (eds.), *Public Expenditures and Policy Analysis*, Chicago: Markham, 1972; and Martin S. Feldstein, James M. Poterba, and L. Dicks-Mireaux, "The Effective Tax Rate and the Pretax Rate of Return," *Journal of Public Economics*, Vol. 21, 1983, pp. 129–158.

<sup>15</sup>See James M. Poterba, *The Rate of Return to Corporate Capital and Factor Shares*, Carnegie-Rochester Conference Series on Public Policy No. 48, 1998, pp. 211–246; and Office of Management and Budget, *Guidelines and Discount Rates for Benefit-Cost Analysis of Federal Programs*, Circular A-94, October 29, 1992.

## Brief Observations on the Insurance Market

That the formal U.S. counterterrorism effort will be heavily governmental is obvious and appropriate given the collective nature of defense activities generally, and also because of the possible presence of economies of scale and scope. Foreign intelligence and clandestine operations, military and diplomatic efforts, defense against attacks conducted through air and water, protection of large public-sector facilities such as dams, coordination activities, investigations of individuals and groups deemed “high-risk,” *ad infinitum*, are obvious primarily government activities.<sup>16</sup> At the same time, individuals and businesses have clear and powerful incentives to protect life and property against terrorist and other threats, and those defensive efforts are likely to proceed in response to perceptions of threats viewed largely as exogenous, in response to the perceived effects of government policies and to the legal environment.

Private parties have incentives as well to pool and reallocate risks efficiently through insurance markets. However, the September 11 attacks have raised the question of whether the insurance markets indeed can do so given the difficulty of estimating the likelihood, timing, and cost of future attacks, and given the sizable potential losses attendant upon terrorist activity.<sup>17</sup> This has engendered a number of proposals for federal “last resort” insurance programs for airlines and other industries.<sup>18</sup>

This argument is curious, in that government involvement in the insurance market is unlikely to improve information on the likelihood and cost of future attacks. Past experience with federal insurance programs, particularly for crops and flood damage, suggests a danger that a government program in the end would insure a disproportionate number of high-risk activities at rates failing to cover marginal cost. Such wealth transfers are likely to be an inevitable outcome of competition under democratic institutions, which will tend to reduce private-

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<sup>16</sup>Note that important collective activities still will be conducted by the private sector: day-to-day interactions with foreign nationals that might yield intelligence insights, screenings and background checks of prospective employees and others, random checks of shipments, and the like. Assistance for the victims of terrorist attacks is likely to remain a private-sector function even though such charitable giving is substantially a collective good.

<sup>17</sup>One potential problem is the effect of state-level price controls on insurance, which can limit the ability of insurers to recover the cost of reinsurance services. In addition, corporate taxes on insurers’ investment income increase the cost of holding capital in reserve to cover large future losses.

<sup>18</sup>See, for example, M. R. Greenberg, “Government Must Be Insurer of Last Resort,” *Wall Street Journal*, November 26, 2001. For a more detailed discussion of potential economic efficiency problems in the market for reinsurance, see Kenneth A. Froot, *The Limited Financing of Catastrophe Risk: An Overview*, National Bureau of Economic Research, Working Paper 6025, April 1997.

sector coverage and to increase risky behavior.<sup>19</sup> There is the further matter that if there is a widespread perception of future government compensation in the event of a terrorist attack—a perception likely to have been encouraged in the aftermath of September 11—private insurance markets are likely to be subverted; this is the standard moral hazard problem.

In any event, the evidence from past disasters suggests that the private insurance market can adapt to a new risk environment without government subsidies.<sup>20</sup> Equity capital per dollar of insured losses roughly doubled between 1991 and 1997 after Hurricane Andrew and the Northridge earthquake, and capacity to cover a \$100 billion catastrophe increased by about 17 percent. Such innovations as catastrophe bonds, originally proposed by Kenneth Arrow in 1952, and other contingent securities may prove to be efficient mechanisms with which to allocate the risk of losses from terrorist attacks.<sup>21</sup> There is little evidence that the insurance market is having difficulty operating insurance and reinsurance markets in the new environment or that serious effects are being borne by the U.S. economy as a result of such conditions.<sup>22</sup> At the same time, the terrorism problem differs from the natural disaster problem in that the behavior of the terrorists is endogenous, so that individuals may impose external costs on each other when “hardening” their own assets, as insurers may provide incentives to do.<sup>23</sup>

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<sup>19</sup>Businesses, for example, would be less likely to adopt such risk-reduction strategies as relocation away from urban centers, dispersion of operations, and the like.

<sup>20</sup>See J. David Cummins, Neil Doherty, and Anita Lo, *Can Insurers Pay for the “Big One”? Measuring the Capacity of the Insurance Market to Respond to Catastrophic Losses*, Wharton School, Working Paper, June 24, 1999; and J. David Cummins, Christopher M. Lewis, and Richard D. Phillips, *Pricing Excess-of-Loss Reinsurance Contracts Against Catastrophic Loss*, Wharton School Working Paper 98-09, 1998.

<sup>21</sup>See Neil A. Doherty, *Financial Innovations in the Management of Catastrophic Risk*, Wharton School, Working Paper, December 1997.

<sup>22</sup>See Jackie Spinner, “Bush Aides Seek Evidence of Insurance Woes,” *Washington Post*, January 8, 2002.

<sup>23</sup>See Darius Lakdawalla and George Zanjani, “Insurance, Self-Protection, and the Economics of Terrorism,” unpublished manuscript, July 17, 2002.

## 6. Conclusions

Unsurprisingly, a national counterterrorism effort notionally is worth a great deal, even in terms of measurable benefits; our crude moderate-, severe-, and nuclear-case estimates of the direct adverse effects of a terrorist war directed against the United States are approximately \$11 billion, \$183 billion, and \$465 billion per year, respectively. Our estimate of the increased public-sector resource consumption engendered by the September 11 attacks is \$196 billion per year, in terms of increased defense/security spending, increased subsidies needed to move political majorities to approve the increased provision of collective goods, and so forth. With respect to such prospective costs, we derive figures for the three cases of \$10 billion, \$200 billion, and \$300 billion, respectively. Even those figures do not include private efforts, both explicit and implicit; and this observed spending has been forthcoming in the wake not of a severe- or nuclear-case series of attacks but instead as a result of one very serious attack. Nonetheless, even in the absence of useful measures of marginal benefits and costs, there are reasons to believe that the United States collectively is not spending too much.

Further analysis of the potential costs of terrorist attacks is needed, as is a method to estimate marginal benefits and costs more closely. The experiences of other nations may be particularly valuable in this respect. Also needed is analysis of the effects of terrorism and counterterrorism efforts in shaping each other, that is, the gaming dimension of the problem, which may offer insights into the efficient design of counterterrorism policies and actions.

It would be useful as well to have better data on the nature and costs of ongoing counterterrorism efforts by state and local governments and by the private sector. Analysis is needed also of the choices among financing instruments at the federal level, of the efficient allocation of responsibilities among governments, and of the extent to which federal financing of state and local counterterrorism activities would be efficient. Finally, because the activities of states and localities and the private sector are likely to reflect reactions to federal efforts, the resulting synergies and gaps might well be examined.

A few additional points are as follows:

- Current efforts to stop or mitigate conventional terrorist attacks are likely to provide some nontrivial protection against attacks with weapons of mass

destruction as well, in that there is likely to be a joint-product dimension to counterterrorism activities; but it is difficult to believe that some additional effort in the latter context would not prove efficient. Accordingly, even a small probability of a very damaging attack might raise significantly the efficient level of resource allocation to counterterror activities.

- A number of private adjustments made by large numbers of individuals in the face of terror threats can be assumed to impose significant costs. Examples are additional time and inconvenience in airports, travel by automobile rather than air when the latter otherwise would have been preferable, the reduction in (economic) well-being not captured by GDP measures, and the like.<sup>1</sup>
- In a game-theoretic framework, it may be efficient to invest (or make a credible commitment to invest) more in counterterrorism efforts than such efforts are worth defined narrowly, as a means of deterring attacks.<sup>2</sup> In simpler terms, an appearance of a certain “irrationality” can be useful, that is, rational.

The preservation of national pride, however difficult to measure, is likely to be a collective good of some importance, perhaps as captured by a stance of “millions for defense, not one cent for tribute.”<sup>3</sup> But, again, the offsetting cost of reduced civil liberties as a by-product of counterterrorism efforts—particularly those conducted domestically—should not be ignored, and indeed is a worthy subject of serious analytic attention even if it proves resistant to quantification.

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<sup>1</sup>For example, a vacation spent in a less-preferred locale because of the terror threat imposes a real economic loss that is difficult to measure except perhaps crudely as the difference in the market prices of the alternatives.

<sup>2</sup>See Schelling (1963).

<sup>3</sup>Thanks are due to C. R. Neu of RAND for suggesting this timely adage.

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