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PAPER

Issues and Options for Government Intervention in the Market for Terrorism Insurance

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RAND
CENTER FOR TERRORISM
RISK MANAGEMENT POLICY

This research described in this report was conducted by the RAND Center for Terrorism Risk Management Policy.

ISBN: 0-8330-3701-3

Published 2004 by the RAND Corporation
1700 Main Street, P.O. Box 2138, Santa Monica, CA 90407-2138
1200 South Hayes Street, Arlington, VA 22202-5050
201 North Craig Street, Suite 202, Pittsburgh, PA 15213-1516
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Preface

Following the 9/11 terrorist attacks, concerns about the insurance industry's ability to provide coverage against the risk of terrorism led Congress to pass the Terrorism Risk Insurance Act of 2002 (TRIA). TRIA is intended to help both commercial policyholders and insurers by requiring insurers to make terrorism coverage available to commercial policyholders, while guaranteeing that the federal government will reimburse insurers for a portion of the losses above a particular threshold. TRIA's impending "sunset"—on December 31, 2005—presents an opportune moment to evaluate what role the U.S. government should play in the terrorism insurance market and to think more broadly about what approach should be taken in the United States to manage risks and to provide compensation for personal injury and property and financial losses due to acts of terrorism.

This paper focuses on insurance, which is only one part of an overall system for managing risks created by the possibility of terrorist attacks and compensating losses caused by terrorist attacks. Disaster assistance, the tort system, and charities can also play a role in this system. This paper should be of interest to federal and state policymakers, decisionmakers in the insurance industry, commercial insurers, commercial policyholders who have a stake in insuring lives and property in the event of terrorism, and individual policyholders.

This is the first in a series of papers that the RAND Center for Terrorism Risk Management Policy (CTRMP) is planning to publish to inform policymakers on terrorism insurance, compensation, and liability. The CTRMP consists of stakeholders from various industries, including primary insurance companies, reinsurance companies, property owners, and other corporations. Funding for this research is provided by these member organizations.

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Summary

The threat of terrorism poses a challenge for the U.S. insurance system: How can the system best insure against potential losses and compensate victims of attacks? Following the 9/11 attacks, the federal government adopted the Terrorism Risk Insurance Act (TRIA), which requires insurers to make terrorism coverage available to commercial policyholders. In return, TRIA guarantees that the public (i.e., the government) will reimburse insurers for 90 percent of losses from terrorism above certain thresholds. TRIA was intended to bolster the insurance industry against catastrophic payouts while the industry developed strategies and mechanisms to cope with the threat of terrorism. TRIA expires on December 31, 2005, but insurance policies (which typically last one year) will soon begin to be written that will expire after TRIA does.

This paper has a dual purpose: to help frame the central issues that should be considered in the debate over whether to extend, modify, or end TRIA, and to explore the broader issue of the appropriate role of disaster insurance within a system for managing risks created by the possibility of terrorist attacks and compensating losses caused by terrorist attacks. The paper also discusses options that policymakers might consider in addressing these issues and goals against which various options can be evaluated.

Although this paper focuses on insurance, it is important to note that insurance is only one part of an overall system for managing risks created by the possibility of terrorist attacks and compensating losses caused by terrorist attacks. Direct government compensation, the tort system, and charities can also play a role in this system.

Key Issues in the Debate over the Terrorism Risk Insurance Act

A review of the debate over TRIA and the role of insurance more generally points to five key issues that need to be considered in developing policies on insurance against losses from terrorist attacks: the capabilities of private insurance markets, the ability of individuals and firms to assess risk accurately, national security considerations, financing of payments to cover terrorism losses, and the desirability of tailoring federal policies to specific insurance market segments or types of terrorist attacks. Each of these topics is discussed in more detail in this section.

The Capabilities of Private Insurance Markets

To what extent are private insurance markets able to provide terrorism insurance at commercially viable rates? The threat of terrorism poses a number of challenges for insurers: It raises the specter of very large losses, and these losses may rarely happen, requiring financial re-

serves to be built up over time.[1] Pricing terrorism insurance products is also difficult for a variety of reasons, including the difficulty of predicting the type and frequency of future attacks. There are also likely to be barriers to controlling insurers' exposure to risk, because states frequently mandate what types of losses must be covered and what rates can be charged. Finally, it may be difficult to spread the risk of losses from terrorism over a sufficiently large base of buyers, which will make it more difficult for insurers to offer affordable products. Given these difficulties, it remains uncertain whether private insurers in the absence of TRIA could provide terrorism insurance at premiums that result in substantial take-up rates.[2]

Accuracy of Risk Assessment

Even if insurers can provide the needed insurance at viable rates, it remains unclear whether businesses and individuals will buy it. Several barriers to a functioning market for terrorism insurance may arise that could keep demand below optimal levels. Potential buyers may misperceive the level of risk, lack good risk information, or focus myopically on the near term. They may also expect public compensation in the wake of attacks to make good their losses. The proportion of policyholders purchasing terrorism coverage has been moderate to low for many categories of firms under TRIA, but it is difficult to assess whether firms are systematically underestimating the risk of a terrorist attack.

National Security Considerations

The insurance and compensation system has implications for national security because the system affects incentives for individuals and firms to invest in protective measures. It can also dampen the effect of terrorist attacks on economic activity, and may even potentially influence the future behavior of terrorists. For example, the perception of effective risk-protection measures and an efficient compensation system could reduce the appeal of terrorist attacks aimed at economic targets.

There are two views on creating appropriate incentives for firms to invest in measures to protect against losses from terrorist attacks. The first holds that private markets provide inadequate incentives for firms to invest in security, and so firms underprotect against terrorist attacks. The second holds that firms overprotect (e.g., through physical security measures) against terrorist attacks because they do not take into account that their security measures can shift risks to other targets. The challenge for policymakers is to distinguish between situations in which the incentives to take precautions are inadequate and those in which they are excessive.

Financing Payments to Cover Terrorism Losses

How should payments to cover terrorism losses be financed? The following three questions are critical to determining how *insurance* payouts will be financed:

1. To what extent should risks be pooled?

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[1] For example, for auto insurance, the premiums that are collected in a given year finance the payouts in that year. For terrorism insurance, premiums may be collected for several years before an event occurs that triggers payouts.

[2] *Take-up rate* refers to the percentage of insurance policyholders that purchase coverage for terrorism losses.

2. To what extent should losses be pre-funded or post-funded?[3]
3. Should purchasing terrorism insurance be mandatory or voluntary?

The body of this paper explores the advantages and disadvantages of the various answers to the above questions and also considers more generally the pros and cons of having insurance play a lead role in a risk-management and compensation system for losses from terrorism. The way in which the above questions are answered will affect how the resulting system looks. For instance, an insurance system in which risks are not pooled, losses are post-funded, and coverage is mandatory would more closely resemble a direct government compensation program than a traditional insurance system. Regularly occurring attacks of limited scope, for example, may well be handled by a traditional insurance-based system, whereas very large but rarely occurring attacks may suggest that a post-funded, direct public compensation system is desirable. More work is needed to explore how the likelihood and severity of terrorist attacks, and the type of losses that result (death and personal injury versus property and financial damage), affect the attractiveness of various approaches.

To What Extent Should Government Policies Be Tailored to Different Insurance Market Segments or Types of Attack?

Workers' compensation, commercial property and casualty, life and health, and personal lines of insurance are all affected differently by the threat of terrorism. A tailored-policy approach—such as a TRIA-type approach for some types of losses and direct government compensation for others—might make sense. Similarly, it may be reasonable to vary government policy by type of attack. Currently, TRIA applies to what is defined as foreign terrorism, and it excludes domestic terrorism. It may also be worth considering whether to develop special policies for chemical, biological, radiological, and nuclear (CBRN) attacks. Further work is needed to better understand whether the four different types of CBRN attacks should be lumped together or treated separately.

Options

The federal government can take three fundamentally different approaches to dealing with terrorism insurance. These approaches vary according to the degree of public (i.e., government) involvement.

The government can rely on private insurance markets. This approach entails the least amount of government involvement. TRIA would be allowed to "sunset," and the government would focus on removing barriers that hinder insurance markets. The following examples of this approach are examined in the body of this paper:

- Catastrophe bonds
- Pre-funded, tax-free catastrophe reserves
- A voluntary pool for workers' compensation.

[3] Losses are pre-funded if insurance premiums are collected or resources are set aside to pay for losses before an attack. See the discussion under "To What Extent Should Losses Be Pre-Funded or Post-Funded?" in Part 3 of this paper for a definition of pre- and post-funded losses.

Even though this approach attempts to assign the bulk of the risk to private markets, it could have the opposite effect if the purchase of insurance is not widespread prior to a major terrorist attack. This approach could be the most reasonable one if policymakers believe that terrorist attacks in the United States are likely to be rare or that it is extremely unlikely that losses will occur again on the order of the 9/11 losses.

The government can share the insurance risk with the private sector. Under this approach, the government would share some of the risk with private insurers. This approach could involve a variety of stances toward TRIA, including extending it, modifying it, or gradually replacing it with a private-insurance pool. In the extreme, the government could provide mandatory terrorism insurance. All of the options under this approach address the difficulty that insurers have providing coverage for very large losses at premiums that result in substantial take-up rates. This approach may make the most sense if terrorist attacks are seen as less-than-rare events and catastrophic losses are more than a remote possibility. In the absence of a substantial terrorist threat, this approach may also be reasonable while perceptions of terrorist risk are diminishing, and it may be reasonable if the insurance industry does not make much progress in the very difficult job of predicting the frequency of attacks.

The government can provide compensation directly. Under this approach, government compensation would replace insurance as the main compensation mechanism. Individuals and firms would be compensated for losses regardless of whether they bought insurance, although they could still buy insurance to augment government compensation. This approach could be the most reasonable one if terrorist attacks become chronic and more than minor in scale. Similar programs—those that are public funded with minimal private-sector involvement—exist in countries that have experienced frequent terrorist attacks, such as Northern Ireland and Israel. Arguments for this approach would be less convincing if attacks become frequent but are small in scale, in which case private insurance may be able to deal with those attacks in much the same way that it deals with crimes or accidents.

Conclusions

Strategies for managing the risk of catastrophic losses from terrorist attacks remain only partially explored. Because the stakes are high, the choice of strategies should be grounded in a clear understanding of how they measure up against system goals. Further research can help not only in this decisionmaking process, it can also help to improve models of the frequency of attacks, to clarify the role terrorism insurance plays in national security, and to examine the role of other forms of compensation, including tort liability. We plan to examine these and other related issues in subsequent studies.

I. Introduction

The terrorist attacks on September 11, 2001, caused tremendous loss of life, property, and income. Insurance payouts to businesses, to homeowners, and to individuals injured or killed in the attacks are expected be the largest for any single event in U.S. history; however, the role played by insurance could be very different in future attacks.[1, 2] Soon after the 9/11 attacks, reinsurers stopped covering terrorism losses, and primary insurers quickly began to limit or exclude coverage for terrorism attacks.

Concern about how the unavailability of terrorism insurance could affect the economy and a desire to give the insurance industry some breathing room while it develops mechanisms and strategies to insure terrorism losses prompted Congress to pass the Terrorism Risk Insurance Act in November 2002 (TRIA). TRIA set up a government insurance backstop for losses resulting from attacks by terrorists acting on behalf of foreign interests (see the appendix for further information on TRIA). TRIA requires insurers to make terrorism coverage available to commercial policyholders. In return, TRIA guarantees that the public (i.e., the government) will reimburse insurers for 90 percent of losses from terrorism above certain thresholds.[3]

TRIA is set to expire on December 31, 2005, and insurers will start writing policies that will not expire until after TRIA does. Lawmakers and stakeholders should start thinking now about whether TRIA should be extended, modified, or allowed to sunset. Deciding what to do about TRIA also provides an opportunity for policymakers to think more generally about what approach should be taken in the United States to manage risks and to provide compensation to individuals and businesses from acts of terrorism.

The purpose of this paper is to help frame the issues that should be addressed in debating the fate of TRIA and the appropriate role of insurance in a risk-management and compensation system.[4] We start by exploring potential goals for the overall system. We then examine five key issues that arise in the debate over TRIA and terrorism risk management

[1] *Insurance* refers to contractual agreements to cover financial losses under specified circumstances. Contracts may be written and/or financed by the private sector or the government. Policyholders typically pay premiums up front for coverage, but the costs of payouts can be recouped post-event.

[2] The Insurance Information Institute currently projects that insured losses due to the 9/11 attacks will total $32.5 billion (Hartwig, 2004). The second-largest insured loss is the $20 billion for Hurricane Andrew in 1992 (Tillinghast-Towers Perrin, 2001).

[3] Reimbursements are made by the U.S. Department of Treasury from general tax revenues. A certain portion of government outlays must be recouped by subsequent surcharges on premiums for commercial property/casualty insurance.

[4] We thank Neil Doherty and Howard Kunreuther at The Wharton School of the University of Pennsylvania and Steven Garber and John Parachini at RAND for their very useful reviews of this paper. We also received helpful comments from several members of the CTRMP advisory board. Nancy DelFavero at RAND skillfully edited the document.

and compensation more generally. Finally, we discuss options that policymakers might consider in crafting policies that address these issues. It is not our intent to recommend a particular option. Rather, it is our intent to identify issues and examine the advantages and disadvantages of various options for addressing those issues. Research continues in the RAND Center for Terrorism Risk Management Policy (CTRMP) to further illuminate the costs and benefits of the approaches outlined in this paper.

We focus on insurance, but insurance is only one part of an overall system for managing risks created by the possibility of terrorist attacks and compensating losses caused by terrorist attacks. Direct government compensation (such as the September 11th Victim Compensation Fund of 2001), the tort system, and charities can also play significant roles in compensating losses caused by attacks. This paper assumes that the current liability regime remains in place and that no special direct compensation or assistance programs for terrorism losses are created. Follow-on RAND studies will examine the roles that liability and direct government compensation might play in managing risk and providing compensation and how the four benefit mechanisms—insurance, direct government compensation, the tort system, and charitable giving—might be combined into an integrated system.

II. Goals for a Risk-Management and Compensation System for Terrorism-Related Losses

The goals for a system designed to manage risks created by the possibility of terrorist attacks and compensate losses caused by those attacks can be framed in terms of economic efficiency, equity, and national security.

Economic Efficiency

Economic efficiency refers to allocating resources so as to maximize the social value of what society produces (Garber, 1998, pp. 241–242). A risk-management and compensation system should provide incentives to individuals and businesses to take actions to maximize the current and future standards of living for society as a whole. The system should create incentives that are appropriate even if a terrorist attack never occurs and that would be appropriate in the aftermath of an attack.

Prior to an attack, the risk-management and compensation system influences the perceived risk of business investments, and it should be structured to encourage levels of business investment that promote economic efficiency. For example, insurance is one tool that businesses can use to reduce uncertainties regarding the possible outcomes of financial investments. It can prevent situations in which businesses avoid making good investment decisions simply because of uncertainty about the outcome of those investments. After an attack, the compensation system can provide incentives and the means to get idle assets and idle workers back to work promptly so that present and future economic production is maximized.

Whatever compensation is to be provided, economic efficiency requires that the provision of benefits be accomplished using the least amount of resources possible. Administrative, legal, and other transaction costs should be minimized.

Equity

Equity can be defined in many different ways. If *corrective justice* is the goal, benefits paid to individuals and businesses would mirror their actual losses. The goal of corrective justice is to restore the individuals and businesses to their pre-event status. *Distributive justice* refers to the way in which the state, or some other organization, distributes assets across possible claimants (Hensler, 2003; Fletcher, 2002). Several different principles have been advocated for distributive justice. Benefits might be allocated equally across injured parties or according to need (Hensler, 2003, pp. 423–426). Definitions of equity would also address society's responsibility to businesses and individuals who do not plan ahead and, for example, who fail to buy reasonably priced insurance. Finally, definitions of equity also apply to how compensation is funded and how the costs of the benefits should be distributed across society. If terrorism is viewed as an attack against the nation as a whole, spreading losses across the entire population might be viewed as being equitable. On the other hand, allocating costs based on the perceived risk of attack (with businesses and residents in higher-risk areas paying more) may be viewed as being more appropriate on the grounds of equity.

National Security

Compensation systems in other settings typically do not have implications for national security. However, the type of compensation system chosen for losses from terrorism may feed back into the frequency and effectiveness of terrorist attacks. Incentives to take precautions may (or, as we discuss below, may not) reduce vulnerability to attacks. Policies that reduce panic, social fragmentation, economic uncertainty, or economic ripple effects will reduce the impact of terrorist attacks. Reduced vulnerability to an attack and reduced impact from an attack may discourage terrorists from carrying out the attack in the first place.

Integrating Goals

As discussion progresses on the goals for a compensation system for losses due to terrorism, tradeoffs and synergies between the various goals should be examined. For example, focusing on security may result in lower economic growth if economically productive assets (such as high-rise buildings in New York City) are not built. Setting insurance rates to reflect terrorism risk (i.e., risk-rated premiums) may be consistent with economic efficiency but may conflict with equity goals. Determining tradeoffs and synergies is part of the difficult but important task of setting priorities among the various goals.

III. Key Issues in the Debate over TRIA and the Role of Insurance in a Terrorism Risk-Management and Compensation System

A review of the debate over TRIA and the role of disaster insurance more generally reveals that the following five key questions should be considered in developing policies on terrorism insurance:

1. To what extent can private insurance markets provide terrorism insurance at commercially viable rates?
2. To what extent can individuals and businesses accurately assess terrorism risk?
3. How should national security considerations factor into policies on insurance and the compensation system more generally?
4. How should payments to cover terrorism losses be financed?
5. To what extent should government policies be tailored to specific insurance market segments or types of attacks?

For each of the five questions above, we summarize the various points of view in the insurance, academic, and policymaking communities and offer observations in light of the goals for a risk-management and compensation system.

1. To What Extent Can Private Insurance Markets Provide Terrorism Insurance at Commercially Viable Rates?

Perhaps the starting point for any discussion on the role of terrorism insurance is to investigate the capacity of the insurance industry to provide that insurance. Terrorism presents special challenges to insurers for several reasons:

- **Possibility of Huge Losses.** Perhaps the biggest challenge is the possibility of huge losses that threaten the survival of insurance companies. Indeed, experts have developed plausible scenarios in which expected insured losses would exceed $250 billion, which would threaten the entire industry (Towers Perrin, 2004, p. 1).[1, 2] Losses from chemical, biological, radiological, and nuclear (CBRN) attacks are of particular con-

[1] Terrorism events may not only result in huge insurer payouts but also reduce the value of insurer assets. Significant insurer assets might be affected directly by a major attack or by a subsequent economic downturn.

[2] Losses from the 9/11 attacks may have been caused directly by the attacks, or indirectly—e.g., road closures during government response to the attacks that triggered business-interruption claims.

cern to insurers because there is little experience with these kinds of attacks and the potential losses are seemingly enormous (Risk Management Solutions, Inc., 2004, pp. 46–52). Losses from such attacks can be widespread and long lasting.

- **Difficulty in Pricing.** The lack of an historical record that is useful in predicting future terrorist incidents makes it very difficult for insurers to price terrorism insurance. The historical record on terrorist attacks that were sponsored by foreign interests in the United States is thin, and because the strategies of terrorists will likely change, historical patterns may be of limited value anyway.[3, 4] Restricted access to government intelligence on terrorist activities increases the difficulty of pricing insurance. The result is that it is very difficult to set prices that are acceptable to both insurers and insureds. Rates that are too high reduce the purchasing of the insurance (and thus reduce the role of insurance in risk management and compensation) and make it difficult for insurers to spread risks over a large number of policyholders. Conversely, rates that are too low create the risk of financial ruin to insurers. While considerable progress has been made in modeling the consequences of particular types of attacks (see, for example, Risk Management Solutions, Inc., 2004), terrorism models remain controversial, primarily due to skepticism over the ability to predict the type and frequency of attacks.
- **Losses Are Rare.** The possibility of large, but infrequent, losses requires reserves to be built up over time.[5] This creates two problems. First, losses may occur before a sufficient reserve has been built up, and, second, taxes increase the difficulty of building up reserves over time.[6]
- **Barriers to Controlling Insurers' Financial Exposure**. States regulate the types of losses that must be covered and the rates that can be charged for many lines of insurance. For example, deaths or injuries at the workplace due to terrorist attacks cannot be excluded from workers' compensation policies, and workers' compensation premiums are closely regulated in most states. Regulatory systems are also poorly suited to quickly adjusting rates in rapidly changing conditions. The result is that it is difficult for insurers to limit their exposure to terrorism losses or to adjust their coverage and prices in response to a highly dynamic terrorist threat.
- **Difficulty Spreading Risk.** There is wide variation among potential buyers in the perceived risk of terrorist attacks. Sometimes these perceptions are based on sound reasoning, and sometimes they are based on hunches that are difficult to substantiate. When insurers offer insurance to a class of buyers for which there is no solid basis for differentiating the rates, only those buyers who perceive that their properties are at high risk of being attacked will buy. The result is that insurers have a smaller base over which to spread their expected losses and find it difficult to offer affordable products.

[3] Lesser et al. (1999) document how terrorism tactics have changed gradually over the years. The question is not whether there will be a change in tactics, but how great the change will be and how quickly it will occur.

[4] Kunreuther and Michel-Kerjan (2004, p. 7) use *dynamic uncertainty* to refer to the changing nature of the terrorism risk as the strategies of terrorists and counterstrategies evolve over time.

[5] For example, for auto insurance, the premiums that are collected in a given year finance the payouts in that year. For terrorism insurance, premiums may be collected for several years before an event occurs that triggers payouts.

[6] Insurer income is taxed before it can be added to reserves set aside in advance of possible losses.

The terrorism insurance programs adopted in many foreign countries attest to the difficulties insurers face in providing terrorism coverage. Australia, Great Britain, France, Spain, and Germany, among others, have developed either insurance or reinsurance programs for terrorism losses.[7] Terrorism risk also bears similarities to many other types of risks for which the federal or state governments have intervened in U.S. insurance markets. For example, the federal government places mandatory flood insurance through the National Flood Insurance Program, the California Earthquake Authority is a quasi-state agency that augments the private market for earthquake insurance, and the federal Urban Property Protection and Reinsurance Act of 1968 authorized federal reinsurance against property losses resulting from the riots of that time.[8, 9]

For all of the above reasons, pessimism about the willingness of private insurers to provide terrorism coverage on their own is understandable. It is difficult to know, however, what the impact of these often-conceptual arguments is in practice. We now turn to evidence on how markets for terrorism insurance are actually working. First we review the performance of the insurance industry over the past few years given the public support provided through TRIA. Then we review predictions of what might happen when TRIA expires.

Availability and Cost of Terrorism Insurance Under TRIA

Interestingly, most insurers are offering coverage for domestic terrorist attacks, which are not covered by TRIA (Marsh, 2004a, p. 38). For example, the St. Paul Companies are not excluding coverage for domestic terrorist attacks from their policies (Saqi et al., 2004, p.10).[10] Reinsurance for these so-called noncertified attacks is widely available at "reasonable" rates (Marsh, 2004a, p. 38).[11] The availability of reasonably priced coverage for domestic terrorist attacks in the absence of a government backstop suggests that insurers and reinsurers do not expect domestic acts of terrorism to be frequent or to lead to very large losses.

The picture, however, for reinsurance for foreign acts of terrorism is much different.[12] Insurers use this reinsurance to cover their deductible and copay under TRIA. Reinsurance for TRIA-covered events is available, but its prices are unattractively high (Marsh, 2004a, p. 38). The result is that most primary insurers have little reinsurance coverage for foreign-sponsored attacks (Saqi et al., 2004, pp. 9-10). There is little reinsurance available for

[7] France and Spain have set up mandatory insurance programs with state backing. Great Britain has adopted a voluntary insurance pool, also with state backing (Guy Carpenter & Company, Inc., 2004).

[8] Like acts of terrorism, floods and earthquakes can affect large numbers of policyholders simultaneously and result in very large insured losses. Losses can vary a great deal from year to year, requiring the buildup of reserves over time. Riot risks share these two characteristics and in addition are driven by the strategic decisions of human actors.

[9] The 1993 bombing of the World Trade Center and the 1995 Oklahoma City bombing did not cause significant disruptions in U.S. insurance markets. The much lower insured property losses ($725 million for the World Trade Center bombing and $145 million for the Oklahoma City bombing) are undoubtedly an important reason why (Swiss Reinsurance Company, 2002, p. 3).

[10] The St. Paul Companies recently merged with Travelers Property Casualty Corp. to form the St. Paul Travelers Companies.

[11] Terrorist attacks that are not sponsored by foreign interests are called *non-certified attacks* because the federal government would not certify that such an attack triggered TRIA coverage.

[12] Insurers buy reinsurance to cover what may be a very substantial deductible and copay under TRIA.

terrorism-related workers' compensation (Saqi et al., 2004, p. 7), and reinsurance for CBRN attacks is strictly rationed (Aon, 2004, p. 15).

Detailed figures on how the cost of terrorism insurance has changed since the passage of TRIA are not readily available. Based on the purchasing patterns of its clients, Marsh, Inc., a leading insurance broker, concludes that the prices have been stable during 2004 (Marsh, 2004b). Information on the level of prices per dollar of coverage or trends in prices between 2003 and 2004 is not publicly available.[13]

Expectations of What Will Happen If TRIA Expires

The lack of reinsurance, even to cover an insurer's deductible and copay under TRIA, means that TRIA (which functions much like reinsurance from the point of view of insurers) is critically important to insurers. There is little confidence among insurers and insurance-industry analysts that insurance coverage for foreign-sponsored acts of terrorism will be widely available at a reasonable cost if TRIA expires. The U.S. General Accounting Office (now the Government Accountability Office) concluded that

> "[a]lthough insurers and some reinsurers have cautiously reentered the terrorism risk market, insurance industry participants have made little progress toward developing a mechanism that could permit the commercial insurance market to resume providing terrorism coverage without a government backstop" (2004, p. 3).

A leading insurance broker believes that one of the reasons reinsurance is expensive and scarce is that reinsurers have not been able to price insurance with enough confidence to satisfy their investors (Aon, 2004, p. 15). There is no reason to think that the situation would improve if TRIA were eliminated.

Some analysts believe that absent another major terrorist attack, insurance and reinsurance companies might gradually return to the market even without TRIA. All bets are off, however, if there is another major event. Analysts both within and outside the industry believe that if there is another attack, insurers and reinsurers would not return to the market absent TRIA, and reinsurers might not even return *with* TRIA (U.S. General Accounting Office, 2004, p. 10; Marsh, 2004a, p. 38).

The lack of confidence in the willingness of insurers to provide terrorism insurance in the absence of TRIA is not unanimous. For example, Smetters (2003, pp. 7, 8) argues that large amounts of capital were flowing into the insurance industry after 9/11 and before TRIA, and that the prospect of TRIA slowed the entry of new capital, thereby creating a false sense of need for TRIA.[14] Smetters also argues that government policies constrain the private market's willingness to cover losses from terrorism. Examples include tax policy regarding insurers' income and restrictive state regulations on catastrophe bonds and other risk-linked

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[13] Marsh reports terrorist premiums as a percentage of total insured value. Total insured value is an amount independent of the amount of insurance purchased and is based on the potential property damage value and business interruption value declared by the policyholder (Rand, 2004). Because the amount of terrorism insurance bought by a firm can change, changes in premiums as a percentage of total insured value do not necessarily correspond to changes in the cost of terrorism coverage per dollar of coverage. Marsh found that premiums as a percentage of total insured value declined in 2003, but rebounded during the first two quarters of 2004 (Marsh, 2004b). The rebound could be due to either higher premiums per dollar of coverage or more comprehensive terrorism coverage.

[14] Doherty et al. (2003, p. 198) found that the recovery of insurance markets in general after 9/11 was intelligible and orderly. However, their analysis did not address the cost and availability of terrorism insurance specifically.

securities (Smetters, 2003, p. 20). Were these problems fixed, the argument goes, private insurers would be able to cover terrorism losses, even very large ones.

Observations

Uncertainty remains over the willingness of insurers to provide terrorism insurance in the absence of TRIA. It appears, however, that little has changed since the passage of TRIA that would increase their willingness. The possibility of huge losses remains, and while insurers appear to have made some progress in predicting the losses from particular types of attacks, little progress has been made in predicting the frequency of attacks—a fundamental factor in setting prices. Terrorists can adapt their strategies as U.S. foreign policy and counterterrorism measures change.[15] It is, thus, inherently difficult to develop meaningful models of terrorist behavior that can be used to predict frequency and then set insurance rates. Hurricanes and earthquakes can produce very large losses and are very complex phenomena, but at least modelers do not have to contend with shifting human strategies.

In the absence of attacks, the availability of terrorism coverage will likely continue to improve, and prices will continue to gradually fall, at least outside major urban centers. Some might argue that the 9/11 attacks were a one-time event, and there is no need for continued government intervention in insurance markets because disruptions in insurance markets will gradually dissipate. Even if other major events do not occur, however, terrorism insurance policy may have important implications for business investment and overall economic output during the lengthy period it takes for perceived risk to diminish.

2. To What Extent Can Individuals and Businesses Accurately Assess Terrorism Risk?

Even if insurers are able to make terrorism insurance available at actuarially fair rates, terrorism insurance will not be widespread unless businesses and individuals are willing to buy it. In this section, we focus on what barriers the demand side of the market might create to a well-functioning terrorism insurance market.

There are a number of reasons, from a social perspective, why businesses and individuals may demand too little insurance:

- **Misperception of Risk.** Kunreuther (1984, p. 213) concludes that, for psychologically based reasons, most residents in areas prone to natural disasters treat such events as being so unlikely that they ignore the potential losses altogether. The number of policyholders often jumps after a flood or other natural disaster and then falls over time in the absence of another disaster. Other researchers have concluded that people do not buy insurance coverage because they want to believe they are living in a safe area (Akerlof and Dickens, 1982). Whether businesses have a tendency to underestimate expected losses is unclear. Research suggests that firms tend to focus on the consequences of an outcome (in particular, the risk of financial ruin) rather than the probability of occurrence (Borkan and Kunreuther, 1979). The result may be that

[15] See Kunreuther and Michel-Kerjan (2004a and 2004b) for a discussion of how losses from terrorism differ from other potentially large losses.

firms overemphasize low-probability events and have an inflated demand for insurance or some other type of risk-management strategy to protect against those events.[16, 17] Conversely, if a firm believes that the risk of the event occurring is low enough, the firm may ignore it.
- **Lack of Publicly Available Information.** Contributing to problems in evaluating terrorism risk is the potential lack of publicly available information on the subject. For example, for national security reasons the government may decline to release information on the likelihood of specific attacks. Lack of information may reduce the perceived need for insurance, although it is also possible that ambiguity over the risk of terrorism may increase the demand for insurance.
- **Myopia.** Individuals and perhaps businesses may focus too heavily on the near term. Surveys have shown that most homeowners in hazard-prone areas have not considered how they would recover in the event they suffer flood damage (Kunreuther, 1984 p. 4).
- **Expectations of Public Compensation.** Individuals and businesses may forgo insurance because they believe that the government will provide compensation after a disaster. The government response after 9/11 reinforces such expectations. For example, the World Trade Center Business Recovery Grant Program provided what amounted to business interruption insurance to small firms that had not purchased it, and significant tax benefits were provided to firms in lower Manhattan that rehabilitated or replaced property damaged in the attacks. While government assistance after an attack can reduce demand for insurance in theory, empirical work is needed to understand how large this effect is in practice.

Terrorism Insurance Take-Up Rates Under TRIA

Terrorism coverage appears to be widespread among very small firms. According to a survey by Marsh, firms with a total insured value (TIV) of less than $5 million regularly receive terrorism coverage as part of package policies (Marsh, 2004a, p. 16). Take-up rates[18] for larger firms are much lower. For companies renewing their insurance policies between April and June 2004, Marsh found take-up rates of

- 37 percent for firms with TIV between $5 and 100 million
- 52 percent for firms with TIV between $100 million and $500 million
- 68 percent for firms with TIV between $500 million and $1 billion
- 44 percent for firms with TIV greater than $1 billion, although the take-up rate was 63 percent for firms in this category in the first quarter of 2004 (Marsh, 2004b).

Take-up rates are higher in the Northeast and Midwest than in the South or West. Between April and June 2004, take-up rates were 58 and 60 percent, respectively, in the

[16] The Sarbanes-Oxley Act of 2002 increased the liability of corporate managers and directors and may have increased the tendency of firms to overemphasize low-probability events.

[17] As discussed above, the focus on risk of ruin also applies to insurers, which explains their reluctance to provide terrorism insurance without a government backstop and/or explains the need for very high-risk premiums in order to provide that insurance.

[18] *Take-up rate* refers to the percentage of insurance policyholders that purchase coverage for terrorism losses.

Northeast and Midwest and 29 percent and 38 percent, respectively, in the South and West (although the take-up rate for the South was 47 percent in the first quarter of 2004) (Marsh, 2004b).

Take-up rates rose gradually throughout 2003 and then jumped in the first quarter of 2004, but held steady in the second quarter of 2004 (March, 2004b). The rise in take-up rates could be due to an increased concern about terrorism. A 2004 study found that 36 percent of the largest businesses in the United Kingdom expect terrorists to deliberately target their organizations or staff, up from 24 percent a year earlier (Claridge and O'Brien, 2004).

Observations

It would be premature to conclude from the moderate take-up rates in 2004 and the much lower take-up rates in 2003 that firms are systematically underestimating terrorism risk or demanding too little insurance because of myopia, lack of information, or expectation of government bailouts. High-risk premiums[19] required by insurers and high underwriting and loss-adjustment costs for terrorism insurance may mean that terrorism insurance is judged to be too expensive even by firms that accurately evaluate risk. Large firms have be able to manage terrorism risk in ways other than buying terrorism insurance—for example, by adjusting their financial leverage or rebalancing their asset portfolios (Doherty, 2000). In addition, regulations in approximately 20 states require standard fire policies to cover damage due to fire no matter what the fire's cause (Marsh, 2004a, p. 32). Thus, terrorism losses for some firms may be covered even if those firms do not buy terrorism coverage. What is more, firms may be less inclined to buy insurance if they are concerned that insurers would not make full payment in the event of a very large attack. TRIA caps combined public and insurer payments at $100 billion. If insured losses are above $100 billion, insurance payments may well be prorated.

Based on experience with individual consumers in other disaster settings (e.g., floods), there is good reason to believe that homeowners will not fully appreciate terrorism risk. However, lines of personal insurance[20] continue to cover terrorism, and take-up issues have not arisen so far.

Moderate or low take-up rates by all but the smallest firms should not be used to diminish the importance of TRIA—the properties most at risk may in fact be taking advantage of the program. But moderate or low take-up rates may have undesirable implications for economic efficiency and equity. Low take-up rates reinforce problems on the supply side of the insurance market. Insurers may not be able to spread risks over a broad base, which increases the risk premium they charge, which in turn would further reduce the attractiveness of insurance as a tool for managing risk, perhaps depressing business investment.[21] Low take-up rates also imply that insurance payments in the event of another major terrorist attack may be modest. The tremendous infusion of insurance money after 9/11 was important in getting the economy up and running again. Losses that are not compensated by insurance or other sources are borne by those who suffered the losses. Low take-up rates would also likely

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[19] *Risk premiums* are premiums in excess of the expected loss (including claims adjustment and administrative costs).

[20] Personal lines include homeowners insurance and nonbusiness auto insurance.

[21] As discussed above, large firms have tools other than insurance for managing risk, and how much the reduced attractiveness of insurance depresses business investment depends on the other tools that are available. The corporate risk-management literature (e.g., see Doherty, 2000) can shed some light on the options and implications.

raise major equity issues after a terrorist attack. Those with insurance would receive at least partial compensation for their losses, while the compensation for those without insurance would be much lower unless government or charity stepped in.

Regardless of whether the low to moderate take-up rates stem from the demand or supply side of insurance markets, if insurance is to play a leading role in covering losses due to terrorism, incentives to purchase insurance in addition to those currently created by TRIA may be needed.

3. How Should National Security Factor Into Policies on Insurance and Compensation More Generally?

A terrorism risk-management and compensation system may impact the future actions of terrorists and the effectiveness of their attacks. National security concerns, thus, should factor into the formulation of policies on terrorism insurance and compensation. The risk management and compensation system could affect national security through its impact on the following:

- **Incentives for taking appropriate precautions to protect against losses from terrorist acts.** The risk management and compensation system will create or undermine incentives for individuals and businesses to adopt protective measures against terrorism and to avoid risky situations.
- **Social cohesion.** Terrorists aim in part to create divisiveness in the hope of altering U.S. policy. Risk management and compensation policies that encourage cohesion may thwart terrorists' aims and perhaps deter future attacks. For example, constant premiums per dollar of coverage across the country may further national cohesion (but those constant premiums may also create resentment among those who believe that policyholders in higher-risk regions should pay more).
- **Economic disruption caused by attacks or the threat of an attack.** A compensation system that provides prompt compensation would dampen economic ripple effects and reduce economic disruption caused by attacks. Economic disruption is relevant to economic efficiency goals, but it might also feed into national security issues. Reduced economic disruption may discourage terrorists from carrying out their attacks. Similarly, the risk management and compensation system can dampen the impact of the terrorist threat on economic activity, which would also reduce terrorists' anticipated payoffs. Robust economic activity will also ensure that the United States has the resources to fight terrorism.

There are two schools of thought on what is needed to create appropriate incentives for taking precautions against losses from terrorism. Some analysts believe that private markets by themselves do not provide adequate incentives for companies to invest in security measures. Orszag (2003, pp. 2–4) provides a long list of reasons why incentives stemming from the private market are inadequate. He argues, for example, that a chemical facility has inadequate incentives to secure dangerous chemicals against terrorist acts because the chemicals may not be used against the facility itself. Kunreuther and Heal (2003) underscore the interdependent nature of security, in which failure by one firm to take appropriate security measures (such as poorly screening airline baggage) increases the security risks to another firm (such as the airline receiving the transferred baggage).

The underlying theme of the above arguments is that firms do not consider the positive effects of protective measures ("positive externalities" in economic jargon) on other parties. To address this problem, Orszag proposes that the government require minimum safety practices and require businesses to carry terrorism insurance. Orszag argues that risk-rated insurance premiums would send a signal to insureds that would induce them to adopt appropriate security measures. However, Kunreuther and Heal (2003) concluded that due to the interdependent nature of security, insurers would not offer premium incentives to invest in protective measures and that as a consequence, public-sector intervention through well-enforced security standards and regulations may be required. Over time, the system could result in the development of best management practices for protection against losses from terrorism.

Another school of thought emphasizes the negative externalities associated with adopting protective measures against losses and avoiding risky situations. Lakdawalla and Zanjani (2003) argue that security measures adopted by one firm may shift the risk to other targets and that firms do not consider such negative effects (i.e., negative externalities) when making security decisions. The result is that firms tend to overprotect against terrorism losses. Attempts to avoid the risk of loss from acts of terrorism may also have other undesirable consequences. For example, a company may decide to relocate in a less-urban area to reduce its exposure to terrorism threats. While this response may make perfect sense from the company's point of view, the firms that are remaining in the old location may face increased risk and there may be an economic efficiency loss. Similar arguments have been made in other contexts. For example, in 1978, Clotfelter argued that efforts to avoid crime were causing people to stay away from public places in urban areas, decreasing the safety of those public places (Clotfelter, 1978). Lakdawalla and Zanjani, as well as Clotfelter, argue for subsidized insurance, which would counter the tendency for firms to overprotect against potential losses or to overavoid areas perceived to face a higher risk of terrorist attack than others. Subsidized insurance would encourage firms to rely more heavily on insurance to cover their losses than on investment in overly costly preventive measures or adoption of socially undesirable avoidance measures.

Observations

The mix of positive and negative externalities undoubtedly depends on the particular context. The challenge for researchers and policymakers is to better understand the situations in which incentives to take precautions are inadequate and the situations in which the incentives are excessive.

While the two schools of thought discussed in the previous subsection address two very different problems, it is interesting to note that both approaches rely on insurance, at least in part, to solve those problems. Subsidized insurance rates that vary in proportion to risk may be applicable to both schools of thought. Research is needed to more fully understand what role insurance can play in creating appropriate incentives.

It seems reasonable that widely available, low-cost insurance could counter incentives for businesses to overly avoid urban areas, for example, but the cost and availability of insurance is only one of many factors that firms would take into consideration in making location decisions. For analysts who emphasize the need for more security measures, terrorism insurance premiums can provide a regular reminder to policyholders that the terrorism threat is real and thus would encourage policyholders to take precautionary measures, but the ability of insurance to provide meaningful signals on what protective measures are appropriate may be very limited. The difficulty of predicting the likelihood of terrorist attacks and uncertainty over whether and what kinds of security measures are effective against terrorists make it difficult to set rates that meaningfully reflect risk. There is also a great deal of uncertainty about how protection or avoidance measures taken by policyholders vary as insurance rates change.

Insurance is only one lever that policymakers can use to create appropriate incentives for firms to take precautionary measures. Direct regulation, as illustrated by Orszag's proposal for mandated minimum safety practices (mentioned above), and liability standards may play useful roles in creating incentives, particularly where incentives to take precautionary measures are thought to be inadequate.

National security concerns typically have not played a prominent role in the development of policies on compensation for losses in other settings. It seems clear, though, that security issues should be considered in the case of terrorism. More work is needed to understand the risk-management and compensation system's implications for national security. The policy community should be careful to avoid making "national security" buzzwords that can be used to obfuscate the real issues or to justify any risk-management and compensation approach or to trump other concerns.

4. How Should Payments to Cover Terrorism Losses Be Financed?

How payments for losses are financed is fundamental to the design of a terrorism risk management and compensation system and to the sort of role insurance plays in that system. In this section, we address three questions that are critical to defining the structure of insurance markets:

- To what extent should risks be pooled?
- To what extent should losses be pre-funded or post-funded?
- Should terrorism insurance be mandatory or voluntary?

We then more generally consider the advantages and disadvantages of having insurance play a lead role in a risk-management and compensation system for losses from terrorism.

To What Extent Should Risks Be Pooled?

Insurance premiums may be set up so that all policyholders pay the same rates per dollar of coverage (so-called flat rates) or so that premiums vary with perceived risk. Risk-rated premiums can in principle provide firms and individuals with appropriate incentives to take precautions or to avoid particularly dangerous situations, and they can prevent policyholders in less-risky parts of the country from subsidizing policyholders in more-risky areas. These attributes of risk-rated premiums can promote economic efficiency and national security goals. Risk-rated premiums also can help to reduce so-called adverse selection in insurance markets. If rates are flat, insurers have to set rates based on the average expected loss, which means that rates are not attractive to policyholders in lower-risk areas. The result may be low take-up rates and a diminishing base over which to spread risks.[22] Because of this type of adverse selection, flat premiums may be sustainable only if insurance were mandatory.

Risk-rated premiums have potential drawbacks on both efficiency and equity grounds. As discussed above, it may be very difficult to risk-rate premiums in any meaningful way. The cost of trying to distinguish between high- and low-risk areas, which may prove to be difficult, may not be worth the potential benefits. Risk-rated premiums may result in policyholders in certain parts of the country paying for losses from attacks targeted at the nation as a whole. The degree to which the threat of terrorism is perceived to apply to the country as a whole, as opposed to just certain urban areas, for example, will be a factor in whether risk-rated premiums are met with approval or resentment.

To What Extent Should Losses Be Pre-Funded or Post-Funded?

If a major terrorist attack occurs under TRIA, a substantial portion of insurer payouts would be post-funded (i.e., paid for by funds raised after the attack). The U.S. Treasury Department does not collect premiums in advance for the reinsurance it provides under TRIA; instead, it is required to recover a certain portion of overall payments after an attack through a surcharge on property/casualty insurance premiums. If premiums for the reinsurance provided by TRIA were collected up front, then a higher share of payouts would be pre-funded (i.e., paid for by funds raised before the attack).

Collecting premiums up front has potential advantages in terms of security and economic recovery. As discussed earlier, premiums for terrorism insurance provide regular reminders of the terrorism threat and may encourage appropriate precautionary measures.[23] Collecting premiums up front also creates a pool of resources that that can be used to help speed economic recovery when financial resources are scarce.

In the context of TRIA, post-funding is attractive because it avoids having to set up a potentially large bureaucracy to collect and invest premiums that would not be needed if a major attack never occurred.[24] Post-funding also allows premiums to be lower than they would be if they were collected up front, at least before a major attack occurs.[25] Lower premiums encourage higher insurance take-up rates and perhaps less overprotection, overavoidance, and adverse selection. However, post-funding may have implications for equity that some policymakers would consider to be undesirable. The losses may be spread over a population other than the one that is most at risk, and the burden of funding the coverage may be pushed forward in time to younger members of the population.[26] On the other hand, as discussed above, some policymakers may support broadly spreading losses post-funded on equity grounds.

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[22] Flat rates may also spiral upward over time: Insurers set rates to reflect the average expected loss, owners of low-risk properties decline to purchase insurance, insurers raise rates to reflect the higher expected losses for those who do insure, and so on.

[23] As also discussed above, terrorism coverage is included in the property insurance premium for the smallest firms.

[24] Pre-funding does not necessarily require a large bureaucracy. Britain's Pool Reinsurance Company, Ltd. uses pre-funding, but staffing levels for the program are modest.

[25] In addition, taxes would likely not be assessed on funds collected after the attack.

[26] For example, under TRIA, premium surcharges to recover U.S. Treasury Department payments are levied on all holders of property/casualty insurance.

Should Terrorism Insurance Be Mandatory or Voluntary?

Under TRIA, purchase of terrorism insurance is voluntary. In some countries (such as France and Spain), buyers must purchase terrorism coverage when they purchase other types of insurance; in other countries (such as Great Britain), purchase of terrorism insurance is voluntary.

The main advantages of mandatory insurance are that risk is spread over a larger base and adverse selection is reduced. Mandatory insurance also means that insurance will be available after all attacks, even in areas perceived to be so immune to terrorism that firms and residents purchase little insurance.

Mandatory insurance would likely result in insurance rates for commercial lines being more heavily regulated than they are now. Because good data are not available to justify differences in rates between low- and high-risk areas, insurance regulators may not allow significant differences in rates. The result may be that owners of properties with a lower risk of being attacked subsidize those who own higher-risk properties. Mandatory insurance may also require insurance companies to provide coverage for properties that create a risk of financial ruin for the insurer.[27] Mandatory insurance restricts the ability of buyers to tailor coverage to their own circumstances, potentially running counter to the goal of economic efficiency.

Is It Appropriate for Insurance to Play a Lead Role in Covering Losses from Terrorism?

On the basis of national security, economic efficiency, and equity, arguments can be made against insurance playing a lead role in providing compensation for losses from terrorism. Levmore and Logue (2003) raise the possibility that government should cover losses from terrorism because doing so would force the government to more carefully consider the costs and benefits of adopting certain foreign policies.

Whether losses are pre-funded or post-funded, insurance contracts mean that resources are committed to specific businesses or individuals after an attack. Gron and Sykes (2003, p. 460) argue on efficiency grounds that insurance contracts executed before an attack may not be the best method for allocating potentially scarce resources after an attack.

Relying on voluntary insurance may produce outcomes that are objectionable on equity grounds. When insurance is voluntary, firms and individuals who receive benefits are those that have the foresight to buy insurance and those that can afford it—perhaps leaving many small businesses and the poor with minimal benefits after an attack. Some policymakers may find basing post-event resource allocation on insurance contracts undesirable in the face of a collective threat. Israel provides an example of a country that relies primarily on direct government compensation rather than on insurance for compensating death, injury, or property damage caused by terrorist attacks.

On the other hand, if insurance plays a lead role in providing compensation for losses from terrorism, it can provide individuals and businesses with the flexibility they need to make decisions that best reflect their preferences and circumstances. Such flexibility can fur-

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[27] Many states have created assigned-risk pools for properties that private insurers do not want to insure. An *assigned risk pool* is a state-created scheme in which all insurers writing certain lines of insurance in the state are required to provide insurance to individuals or entities they would otherwise be unwilling to insure. Typically, insurers must participate in the pool in proportion to the amount of voluntary business they do in that state and must accept the business assigned to them, retaining the profit or absorbing the loss that comes with the assigned customers. How these assigned-risk pools are funded creates its own problems for the industry.

ther the goals of economic efficiency. Greater reliance on insurance would likely mean that the public would cover a lesser share of total losses and shoulder a lesser tax burden. Insurance playing a lead role in providing compensation would also help to ensure that resources will be available to put companies and people back to work after an attack and would take advantage of the efficient claims adjustment and payment procedures that have been developed by the insurance industry.

Observations

An insurance system will look very different and produce very different outcomes depending on how risks are pooled, whether losses are pre-funded or post-funded, and whether the insurance is mandatory or voluntary. Voluntary insurance with risk-rated premiums collected in advance typifies most private insurance markets. An insurance system in which losses are post-funded, the purchase of insurance is mandatory, and premiums do not vary with perceived risk much resembles a direct public compensation program. Policymakers, thus, do not have to view the choice between private insurance and public compensation programs as an either/or but can design hybrid systems that combine the attractive features of both.

A second observation about financing terrorism losses is that equity, economic efficiency, and national security implications thread through each of the issues examined above in complicated ways. Further research is needed to fully understand these implications. Analysts can objectively try to understand how various options affect economic efficiency or national security and can examine the implications for various definitions of equity. In the end, however, assessments of equity are subjective, and these subjective assessments will have important ramifications for the relative attractiveness of various alternatives.

More work also needs to be done to explore how the likelihood and severity of attacks and the type of losses that result (death and personal injury versus property and financial damage) affect the attractiveness of various approaches. Regular attacks of limited scope, for example, may well be handled by a traditional insurance-based system, whereas very large but rarely occurring attacks may suggest a post-funded, public compensation system.

5. To What Extent Should Government Policies Be Tailored to Different Insurance Market Segments or Types of Attack?

The insurance industry provides coverage for many different types of losses, and terrorist attacks can be sponsored by many different types of groups and carried out with various types of weapons. In this section, we explore issues concerning whether and how government interventions in insurance markets should be tailored to different insurance-market segments and various types of attacks.

Variation in Approach by Market Segment

As evidenced by 9/11, terrorist attacks can induce claims in many different lines of insurance. Death and personal injury can generate claims on life and health insurance, workers' compensation insurance, and liability insurance. Damage to personal and commercial property can generate claims on commercial property insurance, residential property insurance, and liability insurance. Lost business income due to facility closures or event cancellation can trigger claims on business interruption, surety, and, conceivably, liability policies.

Terrorism creates different issues for the various lines of insurance:

- **Workers' compensation insurance.** According to many insurers and analysts, terrorism poses the biggest risk for workers' compensation insurers (Saqi et al., 2004, p. 7). Insurers cannot exclude acts of terrorism from workers' compensation policies, and, as discussed above, reinsurance for workers compensation is limited. In addition, workers' compensation insurance is highly regulated at the state level, and in many states (such as California), regulators have not allowed insurers to incorporate the risk of terrorism into their pricing structures (California Department of Insurance, 2002, p. 11). Regulators have also not allowed insurers to vary their rates within states to reflect the perceived differences among areas in their risk of a terrorist attack (such as the difference between downtown Los Angeles and Modesto) (Towers Perrin, 2004, p. 8).
- **Commercial property and casualty insurance.** Insurers have difficulty limiting their exposure to terrorism losses because, as mentioned above, damage caused by a fire following a terrorist attack cannot be excluded from the standard fire policies in approximately 20 states (Marsh, 2004a, p. 32).
- **Life and health insurance.** The 9/11 attacks and any subsequent change in the perception of the risk of future attacks did not create substantial problems for these market segments. An event causing tens of thousands of deaths or serious injuries, however, would likely change the situation. CBRN attacks are of particular concern for these lines of insurance.
- **Personal lines.** Personal lines (i.e., homeowners and automobile policies) are not covered by TRIA. These lines of insurance have been largely absent from the debate on whether to extend or modify TRIA mainly because insurers continue to include coverage for terrorism in standard property/casualty policies. However, an attack causing billions of dollars of losses in personal lines (such as a dirty bomb in a residential area) could well precipitate the kind of market turmoil the 9/11 attacks caused for commercial lines. Personal lines create challenges for insurers because, as with workers' compensation, both the coverage and prices are closely regulated at the state level, and it is difficult for insurers to convince regulators to allow a policy surcharge for a risk that is difficult to predict and for which there is no loss history.

Variation in Approach by Type of Attack

In addition to how best to tailor government interventions in various lines of insurance, there is also debate on how different types of attacks should be treated. The two most visible issues in the debate over TRIA are (1) whether domestic terrorism should be covered and (2) whether CBRN attacks should be treated differently from other attacks. We address each of these issues next.

Domestic Terrorism. TRIA applies to acts committed by individuals "acting on behalf of any foreign person or foreign interest,"[28] but it does not cover acts by foreign sympathizers acting on their own (such as the Los Angeles International Airport shooting in 2002) or acts that are not motivated by sympathies to foreign entities (such as the 1995 Oklahoma City bombing). We refer to the last two categories of attacks as *domestic terrorism.*

[28] Public Law 107-297, Section 102.

Arguments can be made on the grounds of equity for adopting a broader definition of terrorism. Why should benefits that are available after events like the Oklahoma City bombing differ from those after the 9/11 attacks? Basing benefits on the motivation of the attacker may make less and less sense over time because experts warn that it may become increasingly difficult to distinguish between domestic and foreign terrorism (Hoffman, 2003; Hoffman, forthcoming). The problem with such equity-based arguments is that there is no easy way to draw the line between some types of losses and others. If domestic terrorism is included, why not also adopt special programs for victims of drive-by shootings or other violent crimes?[29]

With regard to economic efficiency, there appears to be less rationale for broadening the definition of terrorism than there is with regard to equity, at least so far. The exclusion of domestic terrorism from TRIA appears to have created few problems for the insurance industry, up until now. As discussed above, insurance for domestic terrorism appears to be widely available at reasonable prices. The economic efficiency calculus, however, could change quickly. Even though insurance for losses from domestic attacks is available now, the cost and availability of that insurance could change rapidly if there were a major attack, and the industry might find itself in the same situation for domestic terrorism as it was for foreign-sponsored terrorism after 9/11.[30]

There appears to be little reason to broaden the definition of terrorism on national security grounds. One might argue that by weakening the economy, domestic terrorism might make the United States more vulnerable to foreign attacks, but at this point such a possibility seems remote.

CBRN Attacks. Insurers are particularly wary of providing coverage for CBRN attacks. TRIA covers CBRN losses caused by foreign-sponsored attacks if the underlying insurance policy covers those losses, but even so, nearly all insurers exclude coverage for CBRN attacks whenever they can, regardless of the size of loss.[31] In several large states (such as California and New York), regulators do not allow CBRN losses to be excluded from coverage. The result is that CBRN coverage varies considerably across states and is currently much less complete than is coverage for losses from other types of terrorist attacks.

The enormous potential magnitude of the losses (Risk Management Solutions, Inc., 2004, pp. 46–52) and the difficulty in identifying and quantifying losses are likely the main reasons why the insurance industry shies away from insuring CBRN losses. Health effects may not show up for years, and there may be long debates over proper clean-up strategies. The insurance industry continues to have negative experiences with long-tailed liability for toxic exposure (e.g., asbestos) and for the cleanup of hazardous waste sites under the federal Superfund program, and insurers may see parallels between those experiences and insuring CBRN losses.[32]

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[29] Government compensation programs for crime victims exist in every state, although awards under the programs are not large. The average award per claim in 2002 was $2,900 (Herman and Waul, 2004, p. 24).

[30] Determining whether an attack is sponsored by foreign or domestic organizations may be costly and politically divisive. Difficulties in determining responsibility for an attack may also delay claims payments (it is still not known whether the anthrax attacks in 2001 were domestic or foreign-sponsored).

[31] As Marsh reported, "No more than one or two insurers or reinsurers will even consider offering policies without an exclusion for [CBRN] losses" (Marsh, 2004a, pp. 34, 35).

[32] For information on insurers' experiences with the Superfund cleanups, see Dixon, 1994. For a recent examination of asbestos litigation, see Carroll et al., 2002.

Observations

More thorough investigation is needed into how the capability of insurers to provide coverage at prices that result in widespread purchase of insurance vary by line of insurance. The most effective policy intervention may differ by insurance line. For example, government reinsurance programs may be the best solution for some lines, whereas direct public compensation might be the preferred solution for others. An important first step in the policymaking process might be to prioritize lines of insurance to be addressed in a public policy debate. If only narrow legislation is feasible, such prioritization would help to ensure that the most-pressing problems regarding insurance availability and price are addressed first. Such prioritization should take into consideration the ability of terrorist attacks to severely impact multiple lines of insurance simultaneously and the overall solvency of insurers.

The debate over coverage for CBRN attacks raises the question of whether public policy on terrorism insurance should vary by type of attack (e.g., CBRN, airplane, or car bomb). Losses from CBRN attacks can be of a modest scale. They can also potentially be enormous, but, as demonstrated by 9/11, so can the losses from attacks using conventional weapons. It may make more sense to structure public policy based on the magnitude of the loss rather than the type of attack. Further work is needed to better understand what distinguishes CBRN attacks from other attacks and whether they deserve special treatment independent of their magnitude.

Most discussions of CBRN attacks tend to lump together all four types of attacks—chemical, biological, radiological, and nuclear. However, the range of potential consequences of the four different types of attacks is considerable. While radiological or biological attacks can have devastating consequences, it is highly unlikely that they will be of the same scale or scope as a nuclear attack. Nuclear-weapon attacks are in a class of their own. The debate over CBRN attacks should consider the distinctions among these various types of unconventional attacks and their implications for insurance markets.

IV. Options

The government can take three fundamentally different approaches in crafting policies for managing risks created by the possibility of terrorist attacks and for compensating losses caused by terrorist attacks:

- Rely primarily on private insurance markets for risk management and compensation
- Share risk with private insurers
- Provide compensation directly to those who suffer losses.

In this part of this paper, we provide examples of each approach and examine how they address some of the issues and goals discussed previously. These examples are not the only promising options—other combinations of insurance coverage caps, pre-funding and post-funding of compensation, public risk-sharing, mandatory and voluntary purchase requirements, direct government compensation, and other program features may be attractive. The options discussed here are intended to provide a sense of the range of possibilities and highlight the strengths and weaknesses of the various approaches.

Rely on Private Markets

This first approach entails the least amount of government involvement in terrorism insurance markets. The distinguishing feature of this approach is that the government would not assume any risk for losses covered by terrorism insurance or attempt to limit private-sector financial risk. The government also would not attempt to set up or structure private-sector institutions, such as industry insurance pools.

TRIA would be allowed to sunset, and the government would focus on removing barriers that limit the capacity of terrorism insurance markets to provide terrorism coverage. Each of the options examined next attempts to increase the capacity of insurance markets in a different way. With each option, the government would share with the private sector all the information it is able to share on terrorism risk and try to reduce expectations of extensive public compensation to businesses and individuals after a terrorist attack.

Catastrophe Bonds

The huge resources of the capital market in the United States dwarf the amount of capital that the entire U.S. property/casualty insurance industry has in order to underwrite insurance.[1] This option attempts to tap capital markets to cover terrorism risks. Federal and state regulations would be relaxed to encourage issuance of catastrophe bonds—for example, by making it easier to issue catastrophe bonds for which the principal and not just the interest of the bondholder is at risk (see Smetters, 2003, p. 21).[2]

A limited market for catastrophe bonds has emerged in recent years. Between 1997 and 2002, 46 catastrophe bonds were issued totaling about $5.3 billion (U.S. General Accounting Office [now the Government Accountability Office], 2003, pp. 14–16). A $260 million bond for the 2006 World Cup in Germany is the first and only catastrophe bond issued for terrorism.[3] Nothing on the scale required for a large terrorist event has ever been issued (Property Casualty Insurers Association of America, 2004, p. 6).

Advantages. Catastrophe bonds can potentially be used to access large amounts of capital and cover very large losses. They also avoid the taxes insurers must pay on income before it is added to pre-loss reserves, and they avoid the risk that reinsurers will not be able to pay on claims if they become insolvent (so-called credit risk). Bonds for terrorism risk may be able to leverage experience with natural catastrophes. The hope is that after the government removes barriers to issuing catastrophe bonds, no further government involvement will be necessary.

Disadvantages. Catastrophe bonds for natural disasters have not lived up to the expectations of many insurance analysts. GAO notes that insurers and investors are often "not willing to issue or purchase catastrophe bonds [for natural disasters] because they are more costly than traditional reinsurance, too risky, or illiquid" (U.S. General Accounting Office, 2004, p. 17). There is little reason to believe that catastrophe bonds will be any more successful with terrorism-related risks. The same reasons that limit the amount of coverage through the reinsurance markets will likely limit the success of catastrophe bonds: The potential losses are very large and very difficult to price. Investors may have difficulty assessing the quality of the underwriting and claims-adjustment practices of the insurer offering the bonds and the extent to which only the most vulnerable properties are represented in the insurer's portfolio (U.S. General Accounting Office, 2003, p. 33). Investors may be asking themselves why they should be expected to be any more ready to take on terrorism risk than reinsurers, whose business it is to understand the insurance industry.[4]

Pre-Funded, Tax-Free Catastrophe Reserves

This option takes another tack for increasing the amount of insurance that insurers are willing to write for losses from terrorism. Under current U.S. accounting standards and tax laws, insurers must build any reserves for events that have not yet occurred using after-tax income.

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[1] Capital markets assets had a total market value of $29 trillion in the first quarter of 2003, according to GAO (2004, p. 16). The surplus of the U.S. property/casualty industry was approximately $300 billion at the end of 2001 (Insurance Information Institute, 2002). GAO's definition of capital markets includes U.S. Treasury securities, municipal securities, corporate and foreign bonds, and corporate equities. In general terms, insurer surplus equals liquid assets minus liabilities. Surplus is available to pay policyholder claims, and state regulators watch that the surplus does not fall below certain required levels.

[2] Catastrophe bonds are typically offered through a special-purpose reinsurance vehicle that may be sponsored by an insurance or reinsurance company (U.S. General Accounting Office, 2003, p. 10).

[3] The bond was issued by FIFA, the world soccer federation, with the help of a group of banks led by Credit Suisse First Boston ("Risky Business . . . ," 2003, p. 69).

[4] Kunreuther, Michel-Kerjan, and Porter (forthcoming) further discuss why terrorism catastrophe bonds have so far been largely unsuccessful.

Partly as a result of these regulations, insurers usually do not establish reserves in anticipation of catastrophic events (U.S. General Accounting Office, 2004, p. 17–18). This option would enable insurers to accumulate reserves to cover terrorism losses more quickly by setting aside reserves on a tax-free basis, which could be called upon only when a terrorist event occurs. As suggested by the Property Casualty Insurers of America (2004, p. 5), the phase-out of TRIA could be tied to the accumulation of such reserves.

Advantages. This approach reduces the costs to insurers of building reserves. By limiting the use of reserves to qualified terrorism events, the risk that the reserves would be put to other uses would be small. The government's role could decrease over time as the reserves increase.

Disadvantages. Critics of tax-free reserving argue that it would lower tax receipts and would not increase the overall capacity of the market for terrorism insurance. Reinsurers can already avoid many of the tax burdens that primary insurers face, and primary insurers could simply substitute tax-deferred reserves for reinsurance (U.S. General Accounting Office, 2004, p. 18). This approach also does not address the potential for ruinous losses and the difficulty of pricing coverage for risks in a way that is satisfactory to both investors and insureds.

Voluntary Pool For Workers' Compensation

This approach focuses on perhaps the biggest concern that insurers have about coverage for losses from a terrorist attack. Insurers would cede premiums to a pool that then pays losses above a certain insurer-specific deductible. Participation in the pool would be voluntary, and insurers, not the public, would bear the residual risk if losses exceeded the funds available in the pool.

Advantages. Risks would be spread across all the insurers that participate in the pool, reducing the risk of ruinous terrorist losses to any one insurer. Because the risk of ruin would be lower, firms might be willing to devote more capacity to workers' compensation and offer coverage at prices that are lower than they would be otherwise. According to a Towers Perrin (2004) analysis of such an approach, a voluntary pool would help workers' compensation insurers cover intermediate-sized terrorism losses.

Disadvantages. The primary disadvantage of this approach is that the industry's coverage capacity would still not be enough to respond to a mega-event. A catastrophic terrorist event could result in insured losses of $90 billion or more, which is more than three times the capacity currently backing workers' compensation lines across the industry as a whole (Towers Perrin, 2004, p. 3). A voluntary pool would not by itself address such large potential losses. Industry efforts to set up a voluntary workers' compensation pool have also stalled over the industry's failure to come up with an acceptable formula for specifying company contributions to the pool and fears of large firms that they will be left "holding the bag" if more-poorly capitalized firms go bankrupt.

Observations on Minimal Government Involvement

While all three options discussed in this section might improve matters regarding the availability and cost of terrorism insurance, it is unclear that they address the fundamental problems facing the insurance industry with regard to terrorism. These options might allow insurers to cover larger losses than they would be able to cover without such reforms, but it is still unlikely that the industry would be able to cover the largest losses. These options also do not address the fundamental difficulty of pricing terrorism insurance. The result could be high-risk premiums and few buyers. They do not address CBRN attacks, which insurers appear very reluctant to insure, independent of the scale of such attacks. These options also give the government limited power to shape outcomes to be consistent with national security concerns.

Even though these options attempt to place most of the risk for terrorism losses on the private sector, they may end up shifting most of the risk to the public sector because the purchase of insurance may not be widespread even with these fixes. The precedent set by the 9/11 attacks will make it difficult for the political process to let those who do not buy insurance go uncompensated. Expectations of government compensation may in turn reduce incentives to buy insurance and would undermine this approach.

These are persuasive arguments against minimal government involvement, but they are largely predicated on the existing state of insurance industry regulations. The possibility remains that private insurance markets could do a much better job providing terrorism insurance if regulations were fundamentally reformed, and policymakers should keep an open mind regarding such solutions.

If policymakers pursue options that call for minimal government involvement, they should consider relaxing some of the regulatory requirements that cover insurance for terrorist events. It puts insurers in a difficult spot when they are unable to exclude terrorism losses from workers' compensation and fire insurance policies, but there is inadequate capacity in the insurance markets to cover such losses. History shows that insurers withdraw from markets in such circumstances, and the result could be that problems in the market for terrorism coverage spread to entire lines of insurance.[5] It should also be noted that because insurance in the United States is largely regulated at the state level, changes in regulatory policy would either have to be mandated by the federal government or adopted by state regulators who have been convinced that the changes are necessary.

Minimal government involvement in terrorism insurance perhaps makes the most sense if policymakers believe that terrorism events in the United States will be rare or that it is extremely unlikely that losses on the order of the 9/11 attacks will occur again. If either turns out to be the case, insurers and reinsurers may gradually return to the market (except for covering losses from CBRN attacks) even without TRIA. If, however, the United States adopted one of the above approaches and a major attack did occur, there would likely be major disruptions in insurance markets once again. Furthermore, such approaches would likely result in widespread exclusion of terrorism coverage in the near term, with negative effects on business investment and low insurance payouts should an attack occur while insurers are gradually returning to the market.

Even if minimal government involvement in terrorism insurance does not appear to be particularly attractive, private insurers may still have an important role to play in the overall compensation system. Insurers can take advantage of the efficient mechanisms for writing policies, collecting premiums, adjusting claims, and pooling risk that they have already de-

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[5] For example, insurers began to withdraw from the one- to four-family residential housing markets in California after the 1994 Northridge earthquake in California because they were required to offer earthquake insurance (Roth, 1998, pp. 69-75). Insurers also withdrew from poor inner cities after the civil unrest of the 1960s when state regulators would not allow them to raise rates appreciably ("The Central City Insurance Crisis . . . ," 1971, pp. 665–666).

veloped. We now turn to public-private partnerships between insurers and the federal government.

Government Shares Insurance Risk for Terrorism Losses

Under this approach, the government would assume at least some of the risk for losses from terrorism insurance policies. The government would also be involved to varying degrees in structuring insurance or reinsurance systems. The key assumptions behind this approach are that (1) left to themselves, insurance markets cannot provide coverage for losses from large terrorists attacks, and (2) without government involvement, disruptions in broader insurance markets will result because terrorism coverage is currently mandated in workers' compensation policies and in fire policies issued in approximately 20 states, and insurers cannot control their exposure to terrorism losses from these lines of insurance. Even though government intervention is required, the underlying philosophy of this approach is that private insurance should play a significant role in allocating compensation provided after terrorist attacks and that benefits should go to those who buy insurance.

TRIA Remains in Place

TRIA would be extended beyond 2005. The insurer deductible would remain at 15 percent of the direct premium written (the level the current legislation requires in 2005), and insurers would pay 10 percent of losses over the deductible until total government-plus-industry loss payouts reach $100 billion. The deductible and copay would not be increased beyond the levels required during TRIA's final year because primary insurers are having difficulty finding reinsurance coverage for the current deductible and copay. Insurers would continue to set rates for terrorism coverage, and the purchase of terrorism coverage would be voluntary.

Advantages. The costs of developing the rules and regulations for TRIA have largely already been incurred. This option would not require the establishment of a large bureaucracy in preparation for an event that may never occur, and it would limit the maximum loss to the insurance industry. By providing reinsurance at zero price (before a major disaster), TRIA would continue to subsidize insurance rates, resulting in more widespread purchase of terrorism insurance than there would be otherwise and countering overprotection and overavoidance of risky areas. Rates might vary with risk, potentially providing incentives for appropriate risk management.

Disadvantages. Leaving pricing to insurers and purchasing decisions to policyholders might result in low take-up rates, such as occurred in 2003. As a result, significant uninsured losses might result from future terrorist attacks, which could threaten the economy or require substantial public assistance to uninsured businesses. The obligation to pay the deductible and copayment would be a significant source of risk for some insurers, increasing the prices at which terrorism coverage would be offered. Large exposure to losses on residential policies would remain, and losses from CBRN attacks would not be covered in many cases. Domestic attacks would not be covered, and potentially costly and socially divisive distinctions between domestic and foreign acts of terrorism might have to be made. Insurance rates would be free to vary by region and risk, so that losses would not necessarily be shared by the nation as a whole. The $100 billion cap on loss payouts would mean that insurance agreements might be only partially honored in the event of a very large attack, although Congress would always have the option of making up the difference.

TRIA Expansion

TRIA would be expanded to cover personal insurance lines and domestic acts of terrorism. Coverage for CBRN attacks would be included when terrorism coverage is purchased. The deductible would be returned to 7 percent of the direct premium written, the percentage during the first year of TRIA. To head off potential increases in premiums, the deductible would be reduced if there were major attacks in consecutive years. Purchasing insurance would remain voluntary, and businesses and individuals would be required to buy insurance policies to receive benefits.

Advantages. Expanding the scope of TRIA would preempt potential disruptions in coverage for personal lines and domestic events, such as occurred with commercial lines after 9/11. It would also avoid potentially costly and socially divisive distinctions between domestic and foreign terrorism and result in faster claims payments for cases in which responsibility for the attack cannot be identified. The 7-percent deductible would be more in line with the apparent capacity of the reinsurance industry, and lowering the deductible if there are attacks in consecutive years would anticipate the likely further reduction in reinsurance capacity if those multiple attacks occurred. Resources would be available to cover losses caused by CBRN attacks. Because losses would be funded by surcharges that are assessed after an attack, no large bureaucracy would be required in the absence of an attack, and insurance rates would remain lower than they would be if premiums were collected prior to any attack.

Disadvantages. There remains no guarantee that insurers would offer terrorism coverage at rates that are attractive to policyholders and that insurance coverage would be widespread. Those who do not buy insurance would not be eligible to receive payment for terrorism losses, increasing the demand for federal relief. Rates would be free to vary by region and risk, so that losses would not necessarily be equally shared by the nation as a whole. Such an outcome may not be viewed as being equitable by those who see terrorism as an attack on the nation as a whole.

TRIA Rollback and Replacement with an Industry Pool

The insurer deductible and copay would remain similar to what they are under TRIA, but insurers would cede a portion of the premiums they collect for terrorism coverage to an industry insurance pool. The pool would be controlled and run by the insurance industry, not the government. The pool would pay losses above the deductible and copay, and as the size of the pool increases, the share paid by the government through TRIA would decline. A cap on overall annual insured losses (whether paid by insurers or by the government through TRIA) would remain at $100 billion. After the pool reaches $100 billion, there would be no federal responsibility to cover losses (insurers would be entirely responsible, up to $100 billion). If losses exceed $100 billion, claims payments would be prorated, unless Congress makes up the difference.

Advantages. In the absence of major attacks, the role of the government would gradually phase out over time as the pool increases, and the program would become increasingly privatized. Losses would continue to be capped, reducing the risk of ruin for insurers. Losses are pre-funded to an increasing extent, and resources are set aside in advance to cover terrorism losses.

Disadvantages. Terrorism coverage would likely become more expensive in advance of an attack than it would be under TRIA because insurers would have to cede part of the premiums to the pool (reinsurance under TRIA is provided free of charge before an event occurs). The result might be lower take-up rates than those under the current system. Recent industry efforts to set up a voluntary workers' compensation pool suggest that it will be difficult for insurers to agree on a cost-sharing formula and mechanism to shield the assets of more-stable companies from the credit risks of less-stable ones. Resources would be required to collect the premiums and to manage the pool. Even though these costs would be borne by the private sector, they represent costs to society nonetheless. Those who cannot afford or do not buy insurance would continue to be ineligible for compensation, and the cap may mean that insurance payouts are prorated in the event of very large attacks.

Mandatory Government-Sponsored Insurance

The federal government would become the insurer for terrorism losses, although private insurers could write the policies and adjust the claims.[6] Any business or individual buying insurance coverage would also be required to purchase terrorism coverage. Private insurers would cede the premiums to the government, and the government would reimburse insurance companies for claims paid without a cap. The federal government would set the prices for terrorism coverage, with no attempt to risk-rate premiums by location. Premiums would be reduced, however, for businesses that adopted standard security measures. Terrorism coverage would include CBRN attacks, and would be required up to the same limits as with other lines of insurance. The federal government could borrow money from the U.S. Treasury if losses exceeded reserves but would be required to pay back the Treasury through surcharges on premiums over time.

Advantages. Everyone who purchases insurance would receive terrorism coverage. Because rates would be independent of location, no one area of the country would be penalized for attacks that were directed at the nation as a whole. The pricing scheme would reduce the importance of setting actuarially accurate premiums in advance. If losses were bigger than expected, revenues could be augmented through premium surcharges imposed after the attack(s). If losses exceed premiums that had been collected up to that point, premiums could be reduced as reserves accumulate. The mandatory purchase requirement would enable losses to be spread over a larger base and would reduce the adverse selection problem. Collecting premiums up front would provide funds for recovery after an attack when resources might otherwise be scarce.

Disadvantages. Those who do not buy insurance would not be covered, and those who bought only minimal amounts of insurance would be only partially covered for terrorism losses. A government bureaucracy would be required to set rates, collect premiums, enforce purchase requirements, manage reserves, and reimburse insurers for losses, although the size of bureaucracy required would depend importantly on how the program was imple-

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[6] There are precedents for government provision of insurance for losses from hostile acts against the United States. Under the Marine War Risk Insurance program, which was first established in 1930s, the Secretary of Transportation is authorized to provide insurance coverage to U.S. merchant ships for war damage (See 42 app. U.S. Code 1281, *et. seq.*). In 1942, Congress amended the Reconstruction Finance Corporation Act to authorize the War Damage Corporation, a government corporation created by the Act, to provide war damage insurance to U.S. individuals and businesses (see Public Law No. 77-506, Section 2, 56 Statutes 242–243, March 27, 1942). The program ended with World War II. Both of these programs are voluntary. The option considered here is mandatory, although a voluntary government-sponsored insurance scheme is also a possibility. The advantages and disadvantages of a voluntary scheme would differ from those for a mandatory scheme.

mented. Provisions would also have to be developed for firms that self-insure. By entering into insurance contracts, the government would in effect make commitments to cover insurance losses after a disaster and give up its flexibility on how to allocate scarce funds after a large disaster. For those analysts who believe that firms are taking inadequate precautions, constant premiums may not provide adequate incentives for insureds to avoid the most risky situations or to take appropriate safety measures.

Observations About Government Structuring or Financing of Terrorism Insurance

The options considered under this approach, in which government assumes at least some of the risk for losses, addresses to varying degrees the difficulty that the private sector has in providing coverage for losses from very large events at premiums that will result in substantial take-up rates. By capping the biggest private-sector exposures, these options also reduce the need to develop accurate models of the likelihood of terrorist attacks.

These options make the most sense if terrorist attacks occur more than rarely and if very large losses are more than a remote possibility. In the absence of a substantial terrorist threat, they may also make sense while perceptions of the risk of terrorist events are diminishing, and they may make sense if one believes that the insurance industry will not make much progress in accurately predicting the frequency of terrorist attacks.

If policymakers follow this type of approach, they should consider what to do about those businesses and individuals who cannot afford or do not buy terrorism coverage. Providing public compensation to these groups would fill in the gaps of a compensation system that relies heavily on insurance, but it might also reduce the incentive to purchase insurance in the first place.

Government Provides Compensation for Terrorism Losses

Under this approach, public compensation, not insurance contracts, would be the primary mechanism for providing compensation for losses due to terrorist attacks. The purchase of insurance would not be required to receive compensation, although individuals and businesses might buy insurance to augment public compensation. Because private insurance would play a secondary role, the government would not intervene in insurance markets.

Government-Provided Compensation with Partial Recovery

The federal government would provide a flat payment on the order of $250,000 to the estates of those killed in terrorist attacks. It would also cover medical expenses of those who are injured. Individuals or businesses could purchase life insurance or supplemental medical insurance if they want benefits beyond those provided by the government
Because workers injured on the job would be covered under the federal program, workers' compensation would not be required to cover terrorism. The government would cover a proportion of commercial and personal property damage and business-interruption costs. The portion that would be covered might range from 50 to 70 percent. Businesses and individuals could purchase supplemental insurance for bodily injury or property damage.

Advantages. A basic level of protection would be provided to all businesses and individuals. Coverage would not be dependent on the ability to pay insurance premiums or on the risk perceptions of businesses and individuals. The government would internalize some of the costs of its foreign policies, perhaps leading to better decisionmaking on foreign policy. Losses would be shouldered at least in part by the nation as a whole, reflecting the intent of a terrorist attack (i.e., to injure the whole country). This option would reinforce the sense of the common good, emphasizing that we are all together in the fight against terrorism.

Disadvantages. Higher taxes would be needed to finance payments, and a substantial bureaucracy would be needed to process and pay claims (although the government could contract with insurance companies to adjust claims). Victims of other crimes might resent special benefits for death, injury, or property damage caused by terrorist attacks. Partial recovery would mean that those with the largest losses would suffer disproportionately from attacks directed at the nation as a whole. Those suffering large losses may be able to put pressure on the government to provide additional compensation. Partial recovery may also reduce the economy's resilience to the attacks. Incentives stemming from insurance premiums to take safety precautions or to avoid risky business locations would be diluted.

Government-Provided Compensation with Full or Nearly Full Recovery

This option is similar to the previous option but recovery for losses is more complete. Instead of receiving a flat award of, say, $250,000, the estates of those killed would receive the full or nearly full economic loss. The proportion of property losses and business interruption losses would be 80 or 90 percent.

Advantages. The advantages listed for public compensation with partial recovery would be magnified. Losses would be nearly completely spread across the nation as a whole, perhaps strengthening national solidarity against an external threat. Nearly full recovery would encourage rapid revitalization of the areas affected by the attacks, reducing the long-run visibility of the effects of the attacks. People and businesses would be made whole for losses caused by forces largely out of their control.

Disadvantages. The tax burdens would be greater than with partial compensation, and the process of adjusting death-benefit claims would be more costly and time consuming. Instead of paying a flat sum to the estates of those killed, the economic loss would have to be calculated. The bulk of the payments would likely go to high-income individuals and large businesses. Those who argue for distributional justice as opposed to corrective justice would likely criticize such an allocation of public resources.

Observations About Government-Provided Compensation for Terrorism Losses

The discussion in Part III of this paper under "How Should Payments to Cover Terrorism Losses Be Financed?" outlines the main advantages and disadvantages of the government taking the lead role in compensating losses from terrorist attacks. The nature of the terrorist threat will influence the balance of advantages and disadvantages. If attacks become commonplace and are more than minor in scale, government-provided compensation may make sense. Government-run programs that provide compensation to both individuals and businesses, with minimal private-sector participation, are characteristic of programs in locations that have experienced frequent terrorist attacks, such as Northern Ireland and Israel. Arguments for government-provided compensation may be less convincing if attacks are fairly common but narrow in scope. Terrorist events in such a case would begin to look more like the criminal acts that insurance products are currently able to cover.

V. Conclusions

Compensation for losses plays a critical role in the resiliency of the economy and society as a whole after a catastrophic event. After the 9/11 attacks, insurance provided the bulk of compensation to businesses and individuals that were affected by the attacks; however, the role of insurance in the event of future terrorist attacks remains uncertain. This paper suggests goals that should guide policy on terrorism insurance and the design of a terrorism risk-management and compensation system more generally. We discuss key issues that should be addressed in formulating policy and examples of approaches that might be taken to address these issues.

Strategies for managing the risk of catastrophic losses from a terrorist event remain only partially explored. But the stakes are high, and further research can help to better understand how the various options measure up against system goals. This follow-on effort should include research to

- understand and model the timing and location of terrorist activity, and quantitatively assess the progress in the war on terror
- analyze the consequences of alternative approaches to government intervention in the terrorism insurance market, including the implications for risk management by corporations and individuals and the amount of compensation received from various sources by parties suffering losses
- understand the role of terrorism insurance in national security, including its impact on security allocation decisions, the confidence of U.S. businesses in the face of attacks, and economic resilience in the aftermath of attacks
- understand the role the public sector might play in specifying security standards for businesses and individuals[1]
- improve the availability of information on the terrorism threat, which is critical to pricing insurance on the one hand and buying insurance on the other
- valuate the role of tort liability in future attacks, and its relationship to the availability of other sources of compensation.

This research agenda is ambitious and policy decisions will need to be made before the above issues can be fully examined. Moving ahead quickly with this research will help policymakers to develop more effective responses to the ongoing terrorism threat.

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[1] See Kunreuther and Heal (2003) for further discussion of this point.

Appendix. Background on the Terrorism Risk Insurance Act of 2002

TRIA requires property and casualty insurers to make terrorism coverage available to their commercial policyholders. In return, the federal government agrees to reimburse insurers for payments to commercial policyholders for losses due to terrorism events above certain thresholds. Insurance premiums are set by insurers (subject to state regulation), and purchase of the insurance by policyholders is voluntary. The Act applies to most commercial lines of property and casualty insurance, including workers' compensation insurance, but does not apply to health or life insurance or to personal insurance lines such as home or auto insurance. TRIA applies only to terrorist attacks committed on behalf of a foreign person or foreign interest and when total insured losses exceed $5 million.

After losses exceed an insurance company's deductible, the government covers 90 percent of payments until the combined insurer and public (i.e., Treasury Department) payments equal $100 billion. The insurer's deductible is a fraction of direct-earned premium[1] in previous years—7 percent in 2003, and rising to 10 percent in 2004 and 15 percent in 2005 (U.S. General Accounting Office [now the Government Accountability Office], 2004, p. 13). According to the Insurance Information Institute (Hartwig, 2004), direct-earned premium for property and casualty insurance in the United States totaled $388 billion in 2003, meaning that the industry-wide deductible could amount to as much as $58 billion in 2005 (assuming that losses affect all insurers in proportion to premiums earned).

The government charges no premium in advance for the coverage it provides but is required to recoup a specified portion of its outlays through subsequent surcharges on property/casualty premiums. The government must recoup payments of up to $10 billion in 2003, $12.5 billion in 2004, and $15 billion in 2005.

More information on TRIA is available at the U.S. Treasury's Terrorism Risk Insurance Program Web site at http://www.ustreas.gov/offices/domestic-finance/financial-institution/terrorism-insurance/.

[1] In general, a "direct-earned premium" is the portion of gross premium collected from a policyholder, before the deduction for reinsurance premiums, for which all or part of the insurance policy term has expired. (Insurance premiums are payable in advance, but the insurance company "earns" them only as the policy period expires and in proportion to the expired period.) Under Treasury Department regulations issued to implement TRIA, the direct-earned premium is the premium information reported by insurers in Column 2 of the "NAIC Exhibit of Premiums and Losses of the Annual Statement" (commonly known as Statutory Page 14). See 31 Code of Federal Regulations 50.5(d)(1).

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