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Federal Terrorism Reinsurance: An Update

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Preface

Enacted in response to the events of September 11, 2001, the Terrorism Risk Insurance Act (TRIA) created a temporary federal reinsurance program for terrorism insurance. The program had two main aims: to limit insurance companies' risks of financial loss from terrorist attacks and to increase the availability of terrorism coverage for property owners. TRIA is scheduled to expire on December 30, 2005, and the Congress has been considering proposals to extend the terrorism reinsurance program.

This Congressional Budget Office (CBO) paper—prepared at the request of the Senate Budget Committee—analyzes the TRIA program and assesses changes in insurance markets since the law's enactment in November 2002. The paper builds on two previous CBO reports: *Federal Reinsurance for Disasters* (September 2002) and *Federal Reinsurance for Terrorism Risks* (October 2001). In keeping with CBO's mandate to provide objective, impartial analysis, this paper makes no recommendations.

David Torregrosa of CBO's Microeconomic and Financial Studies Division wrote the paper under the direction of Marvin Phaup and Roger Hitchner. Perry Beider, Megan Carroll, Kim Cawley, Ufuk Demiroglu, Robert Dennis, Richard Farmer, Arlene Holen, Kim Kowalewski, Mark Lasky, Julie Middleton, Robert Murphy, Elizabeth Robinson, Natalie Tawil, Derek Trunkey, and Melissa Zimmerman of CBO provided helpful comments on earlier drafts, as did Jeffrey R. Brown of the University of Illinois at Urbana-Champaign, Ron Feldman of the Federal Reserve Bank of Minneapolis, Lucy Hoffman and C. Christopher Ledoux of the Department of the Treasury, Rade T. Musulin of the Florida Farm Bureau Insurance Companies, consulting actuary Richard Roth Jr., and Kent Smetters of the University of Pensylvania's Wharton School. Steve Atkins of Pool Re, Robert Hartwig of the Insurance Information Institute, Cynthia Lamar of the Reinsurance Association of America, Ann Lavie of Insurance Services Office Inc., Steve Lundin of Marsh Inc., and Mario Ugoletti of the Treasury's Terrorism Risk Insurance Program supplied data and other information. (The assistance of such external participants implies no responsibility for the final product, which rests solely with CBO.)

Christian Spoor edited the report, and John Skeen proofread it. Roger Hitchner took the cover photograph. Maureen Costantino designed the cover and prepared the paper for publication. Lenny Skutnik produced the printed copies, and Annette Kalicki and Simone Thomas prepared the electronic versions for CBO's Web site (www.cbo.gov).

Douglas Holtz-Eakin
Director

January 2005

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Summary

In November 2002, the federal government enacted the Terrorism Risk Insurance Act (TRIA), which created a temporary federal reinsurance program to limit insurers' risk of financial loss from acts of terrorism.[1] At the time, the attacks of September 11, 2001, had made insurers less willing to provide terrorism coverage because of uncertainty about the future risk of, and losses from, terrorist acts. Policymakers feared that a shortage of terrorism insurance could expose property owners to uninsured risk, retard commercial construction, and reduce economic activity in the short run.[2] Indeed, anecdotal evidence suggested that some large construction projects had been canceled or delayed in part because of the lack of terrorism coverage.[3] Many analysts expected that insurers would need some time to reassess the risk of terrorism, raise capital, and eventually reenter the market. But how long that would take was uncertain. The TRIA program was intended to fill the gap in the supply of terrorism insurance, at least until private insurers could recover.

Under TRIA, insurance companies are required to offer terrorism coverage. That coverage is subsidized by the federal government, which agrees to pay 90 percent of an insurer's losses, above a deductible, in the event of an attack by foreign terrorists. The insurer would have to pay the deductible and the other 10 percent of losses—up to a total limit for the program of $100 billion. The government would then be required to recoup some of its costs by assessing surcharges on commercial insurance policies sold after the terrorist attack occurred. Insurers are not charged any premiums for that federal reinsurance, which allows them to spread the risk of loss more widely, thus strengthening their ability to insure against catastrophes.

By increasing the availability of terrorism insurance at below-market rates, the TRIA program has led to a rise in the percentage of companies buying terrorism coverage, predominately in places thought to be at especially high risk of terrorist attacks.

The program is scheduled to expire on December 31, 2005. Some policymakers have called for an immediate extension of TRIA without major amendments. Others would allow the law to expire; still others would extend it with revisions. The Administration has deferred any decision about TRIA's future until at least the summer of 2005, when the Treasury is scheduled to deliver a report to the Congress on the reinsurance program. As part of that report, the Treasury is comprehensively surveying insurers and policyholders about their experiences under the program.

This Congressional Budget Office (CBO) analysis examines the effects of TRIA on insurance markets, the U.S. economy, and taxpayers. The conclusions that it reaches may be relevant to the choices facing policymakers.

- A primary consideration in the decision about TRIA's future is how long the elevated risk of terrorism is expected to last. If the increase in risk turns out to be temporary, TRIA may have succeeded in keeping property owners and insurance companies from overreacting to the attacks of September 11. By providing zero-premium coverage and not requiring policyholders to take actions to reduce their exposure to losses, TRIA effectively lessened incentives for property owners to make costly adjustments to a short-term threat.

- However, the growing belief that the terrorism threat is long-lived does not support a simple extension of TRIA. A persistent high-level risk of terrorism implies

1. Reinsurance, in which one insurer sells some of its business and the associated income from premiums to another insurer, is a common way of spreading risk in the private-sector market for property and casualty insurance.

2. See Congressional Budget Office, *Federal Reinsurance for Disasters* (September 2002), and *Federal Reinsurance for Terrorism Risks* (October 2001).

3. See, for example, U.S. Congress, Joint Economic Committee, *Economic Perspectives on Terrorism Insurance* (May 2002), available at www.house.gov/jec/terrorism/insur.pdf.

that the owners of assets at risk should adopt measures to reduce their losses—for example, by relocating some activities, retrofitting existing structures, investing in disaster-recovery information systems, and installing security systems. By subsidizing insurance rates, TRIA weakens owners' incentives to make those investments.

- The nation might adjust to a sustained high level of risk more quickly if the premiums charged for terrorism insurance reflected higher expected losses. That outcome could be achieved by letting the federal reinsurance program expire or by adding cost-based ("actuarially fair") premiums to the program.

- Alternatives to terrorism insurance also would be likely to develop more quickly if premiums were actuarially fair. That is, the expiration of TRIA or the addition of cost-based premiums could stimulate the development of mutual reinsurance pools and of capital instruments such as catastrophe bonds. Another, less costly alternative to traditional insurance is for owners of the largest assets at risk (and their creditors) to protect themselves by diversifying their holdings among many different properties and locations.

- Letting the TRIA program end would not increase the overall cost to the nation of the risk of terrorism. In fact, losses from terrorist attacks could decline if the resulting higher premiums encouraged firms to adopt measures to reduce losses.

- TRIA's expiration would, however, change who bore the ultimate burden of that overall cost. Under TRIA, most of the cost of the catastrophic risk of terrorism is initially borne by taxpayers. (Future policyholders would reimburse the government for at least some realized losses after the fact, but those surcharges would not compensate taxpayers for bearing the uncertainty and risk of the insurance.) If the TRIA program ended as scheduled, more of the future costs of terrorism risk would be borne by the owners of assets at risk.

- If TRIA expired, the availability and price of terrorism coverage would depend in part on the willingness of private-sector reinsurers to assume the catastrophic risk. There are indications that private reinsurers would fill much of the gap in supply left by TRIA's expiration, but that outcome is not certain.

- If TRIA expired, reinsurers would most likely continue their previous practice of not covering losses from nuclear, biological, chemical, and radiological attacks. That exclusion would be important mainly for the workers' compensation market, because primary insurers that offer workers' compensation policies are required to cover loses from all causes. If such insurers were unable to diversify that catastrophic risk through reinsurance, rates for workers' compensation policies could rise substantially, at least in the near term.

- In the event that the TRIA program ended and an unexpectedly large terrorist attack occurred, insurance markets would probably be disrupted again, and coverage could be unavailable for some high-risk properties.

In sum, as the Congress considers whether to extend TRIA (and in what form), it is useful to consider what has changed in the two years since the law was enacted. The most significant development seems to be a growing sense that the terrorism threat to the United States will continue for the foreseeable future. That development suggests that the economy, especially the stock of physical capital, needs to be responsive to the prospective losses from terrorist attacks. For example, new construction might be designed, located, and built to withstand such attacks. Existing structures might need to be retrofitted with safety features. Those needs argue against extending the TRIA program in its current form, which subsidizes insurance and dampens incentives for mitigation activities.

The macroeconomic costs of scaling back the federal subsidy for terrorism insurance are likely to be small. One reason is that the capacity of insurance companies to provide terrorism coverage has improved recently. Another reason is that TRIA does not lower the costs of terrorist attacks but rather partially shifts those costs from property owners to taxpayers. As noted above, total costs might be lower without TRIA. However, the gains in economic efficiency from allowing TRIA to expire could require a significant trade-off: without the TRIA program, an especially large loss from a terrorist attack would be likely to produce another episode of scarce coverage, rising prices, and uninsured assets.

Federal Terrorism Reinsurance: An Update

As has sometimes happened after an unexpectedly large natural disaster, insurance markets did not function well in the aftermath of the terrorist attacks of September 11, 2001. Although property and casualty insurers were able to pay insured claims, they sharply reduced the availability of terrorism insurance and raised premiums substantially. The Terrorism Risk Insurance Act (TRIA), which lawmakers enacted in November 2002, can be seen as an effort to prevent the economic effects of an overreaction to the heightened risk of losses from terrorism. The September 11 attacks revealed an increase in risk that may have reduced the value of many assets. However, the extent of the increase in risk—and of the reduction in asset values—was uncertain. That uncertainty enhanced the potential for insurers and property owners to misestimate the change in risk and asset values.

After September 11, analysts anticipated that insurers would need some time to recover financially from their losses, adjust their models of risk, and reenter the market. Consequently, TRIA created a temporary program designed to immediately boost the supply of terrorism insurance and bring down premiums. It also provided time for property owners and insurers to reassess risks. That program is scheduled to expire at the end of calendar year 2005.

TRIA's Provisions

TRIA requires all commercial property and casualty insurers to "make available" terrorism coverage to their policyholders and to disclose the premium charged for that coverage.[1] The terrorism insurance cannot differ materially from the terms, amounts, and other coverage limitations that apply to losses from nonterrorist events. However, TRIA does not require property owners to purchase terrorism insurance.

In the event of an terrorist act as defined by TRIA, the federal government would reimburse (or reinsure) insurance companies for a significant portion of their terrorism claims. Reinsurance—in which one insurer sells some of its business and the associated income from premiums to another insurer—is a common practice in the private-sector property and casualty market worldwide.[2] Reinsuring hazards with third parties allows primary insurers to diversify their risks and avoid ruinous losses from a single event. TRIA's reinsurance is limited in several respects, one being that only acts by foreign terrorists are covered. (For details about exclusions under TRIA, see Box 1.)

In the TRIA program, primary insurers would have to absorb some losses before federal reinsurance would begin to pay. Specifically, each insurer is responsible for a

1. TRIA applies to the following types of commercial insurance policies: property coverage, business-interruption coverage (which replaces financial losses when damages force companies to suspend operations), commercial liability coverage, workers' compensation coverage (which reimburses lost wages and medical costs from on-the-job accidents and pays benefits to survivors of employees killed on the job), and surety bonds (third-party guarantees of the performance of a specific obligation). A separate federal program provides terrorism insurance for air carriers. See Debra J. Roberts, *Terrorism Risk Insurance Act of 2002: A Primer* (Washington, D.C.: Center on Federal Financial Institutions, November 16, 2004), available at www.coffi.org/pubs.html. Some "commercial" policies also cover single-unit dwellings. The California Insurance Department classifies an insurance policy on a non-owner-occupied single-unit dwelling as a commercial policy subject to TRIA. At least one insurance company made a rate filing for such a policy but set the terrorism premium at zero. Personal communication to the Congressional Budget Office by Richard J. Roth Jr., consulting actuary with Bickerstaff, Whatley, Ryan & Burkhalter, September 24, 2004.

2. Many European countries have also established terrorism insurance programs. They are typically reinsurance pools, in which taxpayers bear most of the financial risk from large terrorist events. For more information about those programs, see Appendix A.

Box 1.

Losses Excluded Under TRIA

One goal of the Terrorism Risk Insurance Act was to restore the terrorism coverage that had been dropped after the attacks of September 11, 2001—not to expand the previous range of coverage. Consequently, coverage under TRIA is incomplete because gaps in coverage existed before September 11.

In general, TRIA covers neither acts of terrorism by domestic groups nor acts of war. (An exception exists for losses under workers' compensation insurance, because most states do not allow any exclusions under that type of coverage.) Moreover, private insurers generally continue to exclude losses from nuclear, biological, chemical, and radiological attacks from property and casualty coverage (but not workers' compensation), as they did before TRIA was enacted. The federal program does not mandate that losses from those sources be included, but it will cover them if the primary policy does. In addition, before federal payments would be made, the Secretary of the Treasury would have to certify that losses were related to international acts of terrorism and exceeded $5 million. Federal payments would not cover punitive damage awards.

Up to now, financial losses in the United States from nuclear, biological, chemical, and radiological attacks have been insignificant, and losses from acts of terrorism by domestic groups have been readily assumed by insurers. TRIA's certification process is untested, however, and some analysts worry about what would happen in cases in which the identity of a terrorist was hard to verify. For example, investigators have not yet identified the source of letters containing anthrax, which killed several people and sickened many more in 2001 when they were mailed to Members of Congress and others.

deductible, which in 2005 equals 15 percent of its premiums on commercial property and casualty policies during the previous year. For some of the largest insurers, that deductible amounts to hundreds of millions of dollars.[3] Once an insurer had met the deductible, the federal government would pay 90 percent of the insurer's terrorism losses and the insurer would pay 10 percent—up to a total cap for the program of $100 billion per year. If insured losses exceeded that limit, Congressional action would be required to provide additional assistance. However, according to TRIA, insurers that met their deductibles (and made their 10 percent copayments) would not be liable for any insured losses exceeding the $100 billion cap.

The government charges insurers no premiums for its reinsurance. However, if it paid any claims under TRIA—which has not happened so far—the government would be required to recoup a certain amount of its losses by assessing surcharges on commercial insurance policies sold after the terrorism event occurred. That amount of losses, known as the aggregate industry retention level, is set at $15 billion in 2005. To recoup it, the Treasury would have to assess annual surcharges of up to 3 percent of premiums on all commercial policyholders—even those that did not purchase terrorism insurance. The Treasury also has the discretion to recoup additional losses through continued assessments. Consequently, over the long term, TRIA's effect of the federal budget could be neutral—cash outlays could be offset by subsequent receipts from surcharges.

To encourage the development of private terrorism insurance, TRIA raises the industry retention level and insurers' individual deductibles each year. The industry retention level grew from $10 billion in 2003 to $12.5 billion in 2004 to the current level of $15 billion. Likewise, deductibles equaled 7 percent of premiums in 2003 and 10 percent in 2004 and equal 15 percent now.

TRIA and the program it established are due to end on December 31, 2005. Before that (by June 30), the Secretary of the Treasury is required to complete a study of the

3. See Vinay Saqi and others, *Correction: Assessing Insurers' Terrorism Risk* (New York: Morgan Stanley Equity Research, March 24, 2004); and R.J. Lehmann, "Despite Federal Backstop, Terror Exposures Could Exceed Sept. 11 for Many Insurers," *BestWire,* on-line wire service from A.M. Best Co., March 25, 2004.

effectiveness of the law. Proposals have been made to extend the TRIA program, in some cases with modifications. Examining the effects of the program to date may be useful to policymakers who face choices about TRIA's future.

Effects of TRIA on Insurance Markets

The Terrorism Risk Insurance Act added a subsidized federal source of reinsurance and gave the insurance industry time to improve its ability to forecast losses and to gradually reenter the market. For owners of high-risk properties, the law has succeeded in increasing the availability and lowering the price of coverage for property and casualty losses from terrorism. As a result, TRIA has led to an increase in the percentage of companies purchasing terrorism coverage.

Effects on the Supply of Terrorism Insurance

TRIA has served its purpose of immediately expanding the supply of terrorism insurance. It has also given private insurers time to raise financial capital and improve their models of risk, which have indirectly contributed to increasing the supply of coverage.

Mandatory Offer of Coverage. The requirement that insurance companies offer coverage and the federal government's assumption of much of the catastrophic risk for that coverage have made terrorism insurance much more available than it was in the months following the September 11 attacks. TRIA required the Secretary of the Treasury to determine by September 1, 2004, whether the law's "make available" requirement should be extended through the third and final year of the program. In June 2004, the Secretary opted to extend that requirement through 2005. Because commercial insurance contracts are renewed throughout the year, the Secretary made that determination in advance of the deadline to prevent disruption in insurance markets.[4]

Unlike primary insurers, reinsurers in the private sector are not covered by TRIA. At current prices, most insurers are not buying private reinsurance to cover their potential deductibles and 10 percent copayments under TRIA. However, reinsurance for acts of terrorism not covered by the law (such as terrorism by domestic groups) and for certified workers' compensation is widely available and is being purchased.[5]

Financial Condition of Insurers. Insurers' capacity to provide coverage depends on their net worth (assets minus liabilities) and the availability of reinsurance. The largest component of net worth is their accumulated stock of retained earnings.

The net worth of property and casualty insurers dropped after September 11. Insured losses from the attacks have been estimated at $30 billion to $35 billion.[6] Insurers' total underwriting losses—the difference between their premium income and expenses—reached $52.6 billion in 2001. With insufficient investment income in 2001 to offset those underwriting losses, the industry's net worth fell by $27.8 billion that year.[7]

Under TRIA, property and casualty insurers have replaced capital and are earning underwriting profits for the first time in nearly 20 years, in part because of rela-

4. See Department of the Treasury, "Treasury Announces Decision to Extend the 'Make Available' Provisions of the Terrorism Risk Insurance Act into 2005" (press release JS-1734, June 18, 2004).

5. Marsh Inc., *Marketwatch: Property Terrorism Insurance 2004* (New York: Marsh & McLennan, April 2004), pp. 27-29, 38.

6. As of July 2004, the Insurance Information Institute estimated $32.5 billion in insured losses from the September 11 attacks, including $11 billion in business-interruption losses, $9.6 billion in property losses, $3.5 billion in aviation liability, $1.8 billion in workers' compensation, and $1 billion in life insurance payments. See Robert P. Hartwig, Insurance Information Institute, "The Fate of TRIA: Is Terrorism an Insurance Risk?" (presentation at the New York Insurance Association Annual Conference, Saratoga Springs, N.Y., June 3, 2004), available at www.iii.org/media/presentations/tria/. A recent court ruling could increase insurance payments for the attacks by $1.1 billion; see Charles V. Bagli, "Towers' Insurers Must Pay Double," *New York Times*, December 7, 2004, p. A1. In addition, the federal government's September 11th Victim Compensation Fund has made $7 billion in death and disability payments related to the attacks.

7. Insurance Services Office Inc. and the National Association of Independent Insurers, "Decline in Surplus Tarnishes P/C Industry's Return to Profitability in 2002" (press release, Jersey City, N.J., April 16, 2003), available at www.ISO.com/press_releases/2003/04_16_03.html.

tively low catastrophic losses.[8] Consequently, the net worth of the industry rose to $370.4 billion on June 30, 2004, from $285 billion at the end of 2002.[9]

Modeling Insurance Losses. TRIA also provided time for the industry to improve its ability to predict losses from terrorism and thus to put a price tag on risk more accurately. Several competing models that predict the risk of losses from terrorism by zip code or by individual location are now available from EQECAT, Risk Management Solutions (RMS), and Applied Insurance Research Worldwide (AIR).[10] The level of detail in the new models allows insurers to distinguish the higher risk faced by city centers from the lower risk faced by outlying urban areas. Each model contains a list of potential terrorist targets and produces estimates of the severity of losses associated with different types of attacks.

Although substantial progress has been made in modeling terrorism losses, the new models are not as reliable as those for natural catastrophes, which are based on more than 100 years of data rather than on two major events in the past 11 years (the September 11 attacks and the 1993 bombing of the World Trade Center). Terrorism models are hampered not only by a lack of data but also by the absence of an established "theory" of terrorist attacks. For example, the RMS model assumes that most of the risk is concentrated in a few major cities and in a limited number of landmark properties with high visibility. In contrast, the EQECAT model assumes that terrorists might attack low-profile targets in outlying areas to demonstrate that no place is safe. Moreover, the EQECAT model assumes that terrorists will change their tactics when efforts are made to reduce risks at specific sites. Although opinions differ about the accuracy of the models, lack of consistency between models need not hinder development of a private market. The private sector has been able to insure against natural disasters despite varying estimates of losses from such events.

Notwithstanding concern by some actuaries that existing tools are not good enough to predict losses from terrorism—and thus to set prices for coverage—insurers use a calculated benchmark for setting premiums. The Insurance Services Office (ISO), a company that provides data and analytic services to insurers, files advisory estimates of loss costs (expected annual losses over the long term) with insurance commissioners in each state. Once state commissioners approve an ISO advisory, any insurance company operating in that state can use the estimates as a basis for setting premiums without having to undertake the formal rate-filing process. In 2003, all 50 states approved ISO's estimates of loss costs.

ISO's estimates—which are based on a model for estimating terrorism losses developed by its subsidiary, AIR—are location-specific. On the basis of that model, ISO placed

8. Insurers' net income after taxes rose to $23.5 billion in the first half of 2004 from $14.5 billion in the first half of 2003. For 2003 as a whole, the industry's net income after taxes was $29.9 billion, versus just $3 billion in 2002. See Insurance Services Office Inc. and the Property Casualty Insurers Association of America, "Property/Casualty Industry's First-Quarter Net Income Doubles as Earnings Approach Cyclical Peak" (press release, Jersey City, N.J., June 29, 2004), available at www.ISO.com/press_releases/2004/06_29_04.html. For the first six months of 2004, the industry earned an underwriting profit of nearly $9 billion; see A.M. Best, "Property/Casualty Insurers Post Solid Results; Surge in Hurricane Losses Changes Tone for Upcoming Quarters" (press release, Oldwick, N.J., September 20, 2004), available at www.ambest.com/press/. Losses from Hurricanes Charley, Frances, Ivan, and Jeanne are likely to weaken performance in the third quarter of 2004 because claims are likely to exceed $20.5 billion; see Insurance Services Office Inc., "Insurers Suffer Record $21.3 Billion in Third-Quarter Catastrophe Losses, Says ISO's Property Claim Services Unit" (press release, Jersey City, N.J., November 2, 2004), available at www.iso.com/press_releases/2004/11_02_04.html. Also see Insurance Services Office Inc. and the Property Casualty Insurers Association of America, "Property/Casualty Industry's First-Half Income and Surplus Rose on Strong Underwriting Results and Investment Gains" (press release, Jersey City, N.J., Oct. 18, 2004), available at www.iso.com/press_releases/2004/10_18_04.html.

9. Not all of that net worth would be available to cover losses from a terrorist attack, because the actual losses for individual companies might not match their capital. According to estimates, about 40 percent of the industry's stock of retained earnings backs types of insurance that include terrorism coverage. See Robert P. Hartwig, "2004 Mid-Year Property Casualty Insurance Update: Trends & Challenges in P/C Insurance Business Today" (PowerPoint presentation, Insurance Information Institute, July 1, 2004), available at www.iii.org/media/presentations/2004midyear/.

10. For more information about those models, see Towers Perrin, *Workers' Compensation Terrorism Reinsurance Pool Feasibility Study* (April 14, 2004), pp. 35-38 and 54-63, available at www.towersperrin.com/tillinghast/publications/reports/WC_Terr_Pool/WC_Terr_Pool_Study.pdf.

New York, Washington, D.C., Chicago, and San Francisco in the highest tier and recommended loss costs of $0.10 per $100 of property value. (Actual prices for insurance would be adjusted upward to also cover administrative costs, the cost of capital, and risk.) Cities in the highest tier, however, objected that such rates would hurt businesses. Subsequently, ISO lowered its estimate of maximum losses to $0.03 per $100 of property value in downtown city centers and to lesser amounts for properties on the outskirts of those cities. Tier 2 rates—covering Boston, Houston, Los Angeles, Philadelphia, and Seattle—were set at $0.018 per $100 of property value. Rates for tier 3—covering the rest of the country—were set at $0.001 per $100.[11]

Although the probability of events such as terrorist attacks cannot be known, the maximum amount of losses can be estimated, because property values and replacement costs are known. Modelers agree that the insurance industry could face losses from a single event greater than those experienced on September 11.[12] In particular, losses for workers' compensation policies, which cover all contingencies, could be far higher than the less than $2 billion in claims that followed September 11. For example, the EQECAT model estimates a one-in-100 chance of losses of at least $13.7 billion for workers' compensation insurers. The RMS model puts that one-in-100 chance of loss at $3.8 billion.[13] Those two models also assign very different losses to events with a more remote possibility of occurring and different probabilities to specific terrorist attacks.[14]

Capital-Market Innovations. Although capital markets are currently absorbing some terrorism risk, the development of financial instruments for spreading that risk would probably be more rapid in the absence of TRIA. The reason is that private alternatives have difficulty competing with a free federal program.[15] Because international capital markets are larger than insurance markets, they could potentially absorb the losses from a terrorist attack without significant disruption. Daily fluctuations in the overall value of traded capital assets worldwide can easily exceed the losses incurred on September 11.[16]

In the absence of TRIA, catastrophe bonds—which fully or partly forgive the bond seller from making interest and principal payments in the event of specified catastrophes—might be used for terrorism losses, as they have been used to spread the risk of natural disasters.[17] (For more information, see Appendix B.) Two international catastrophe bonds have been issued that combine terrorism risk with other risks.

11. Pool Re, the United Kingdom's reinsurance pool, has a similar tiered pricing structure, with rates highest in central London. The British government stands behind that reinsurance pool. See Appendix A of this report and Howard Kunreuther, Erwann Michel-Kerjan, and Beverly Porter, *Assessing, Managing and Financing Extreme Events: Dealing with Terrorism,* Working Paper No. 10179 (Cambridge, Mass.: National Bureau of Economic Research, December 2003), available at http://papers.nber.org/papers/w10179.

12. The nation has been told to expect more terrorist attacks, possibly including attacks more extreme than those of September 11. See National Commission on Terrorist Attacks Upon the United States, *The 9/11 Commission Report* (July 22, 2004), available at www.9-11commission.gov/report/index.htm.

13. Reinsurance broker and actuarial consulting firm Towers Perrin uses a blended model that reflects 80 percent of RMS's estimates and 20 percent of a proxy measure comparable to EQECAT's estimates. (The proxy measure has fewer and simpler assumptions and does not define specific target sites.) See Towers Perrin, *Workers' Compensation Terrorism Reinsurance Pool Feasibility Study,* pp. 35-38 and 54-63.

14. EQECAT estimates that a one-in-500 loss is $47.6 billion, whereas RMS estimates such a loss at $7.7 billion. Expected annual costs were not reported. See Towers Perrin, *Workers' Compensation Terrorism Reinsurance Pool Feasibility Study,* Exhibit 8, p. 23, and Exhibit 9, p. 24.

15. For an analysis of capital-market products for disaster risks, see General Accounting Office, *Catastrophe Insurance Risks: The Role of Risk-Linked Securities and Factors Affecting Their Use*, GAO-02-941 (September 2002).

16. See Kent Smetters, "Insuring Against Terrorism: The Policy Challenge" (paper prepared for the January 8-9, 2004, Conference of the Brookings-Wharton Papers on Financial Services, February 2, 2004, draft), available at http://irm.Wharton.upenn.edu/WP-Insuring-Smetters.pdf. Also see Neil A. Doherty, "Financial Innovation in the Management of Catastrophe Risk," *Journal of Applied Corporate Finance*, vol. 10, no. 3 (Fall 1997), pp. 84-95.

17. Other factors besides TRIA—such as a number of complex accounting, regulatory, and tax issues—have limited the further development of the catastrophe-bond market. See General Accounting Office, *Catastrophe Insurance Risks: Status of Efforts to Securitize Natural Catastrophe and Terrorism Risk*, GAO-03-1033 (September 2003).

Effects on Prices for Terrorism Insurance

TRIA accelerated a previous trend of declining prices for terrorism insurance.[18] Since the beginning of 2003, rates for that insurance have fallen by half. In the third quarter of 2004, the premium for terrorism coverage typically represented about 4 percent of the total premium for property insurance—down from more than 10 percent in the first quarter of 2003 (see Figure 1). That drop occurred as insurers' own deductibles under TRIA were rising, which would normally cause insurers to raise premiums.[19] TRIA is probably not responsible for the entire drop in rates in 2003, because more capital was entering the insurance industry and insurers were learning more about pricing terrorism risks.[20]

Despite TRIA, terrorism coverage remained costly in 2003, especially for high-risk properties. A survey by the Council of Insurance Agents and Brokers showed that in that year, terrorism coverage added 10 percent to the average property insurance premium for small and medium-size accounts and up to 20 percent for larger accounts. Landmark properties in major urban areas faced even higher additions. For example, one insurance broker reported that in Manhattan, terrorism risks could be priced at 100 percent of the rate for property insurance, compared with just 5 percent to 10 percent in other sections of New York City.[21]

In 2004, the median cost of purchasing terrorism insurance ranged from $53 to $80 per $1 million of insured value (or between 0.53 and 0.80 basis points). Although that cost dropped by more than 40 percent between the second and fourth quarters of 2003, it returned to higher levels in the first half of 2004 as companies purchased more-comprehensive coverage (see Figure 2).[22] Because of the increasing level of coverage, that rise in overall cost may have masked a continuing trend of falling rates. The overall cost of terrorism insurance came back down in the third quarter of 2004.[23]

Effects on Purchases of Terrorism Insurance

Purchases of insurance against terrorism-related losses were initially low under TRIA but have since increased sharply. After the cost of terrorism coverage fell substantially in 2003, the percentage of firms buying policies nearly doubled.[24] A recent survey by an insurance broker shows that 44 percent of large companies bought terrorism coverage in the third quarter of 2004, compared with

18. Through early 2002, insurers were pricing terrorism coverage in the expectation that attacks similar in magnitude to those on September 11 were likely in the near future; see Ben Gartson, Lloyd's Terrorism Panel, "Terrorism Insurance: An Overview of the Private Market" (background note presented at the Organization for Economic Cooperation and Development Conference on Catastrophic Risks and Insurance, November 22-23, 2004). During the first nine months of 2002, however, prices for terrorism insurance declined by 50 percent to 75 percent, according to insurance brokers. The available limits (or maximum coverage that could be purchased) also increased substantially during that period. See Shadow Financial Regulatory Committee, *A Proposed Federal Backstop for Terrorism Insurance and Reinsurance,* Statement No. 182 (Washington, D,C.: American Enterprise Institute, September 23, 2002), available at www.aei.org/publications/pubID.14325/pub_detail.asp. Also see Jeffrey R. Brown and others, "An Empirical Analysis of the Economic Impact of Federal Terrorism Reinsurance," *Journal of Monetary Economics*, vol. 51 (July 2004), Figure 4, p. 893.

19. By contrast, the rise in the aggregate industry retention level from $10 billion in 2003 to $12.5 billion in 2004 should not affect premiums. That increase affects only the size of the potential surcharges that the Treasury might have to levy in the future.

20. Brown and others, "An Empirical Analysis of the Economic Impact of Federal Terrorism Reinsurance," pp. 861-898.

21. Council of Insurance Agents and Brokers, "Many Commercial Interests Are Not Buying Terrorism Insurance, New CIAB Survey Shows" (press release, Washington, D.C., March 24, 2003).

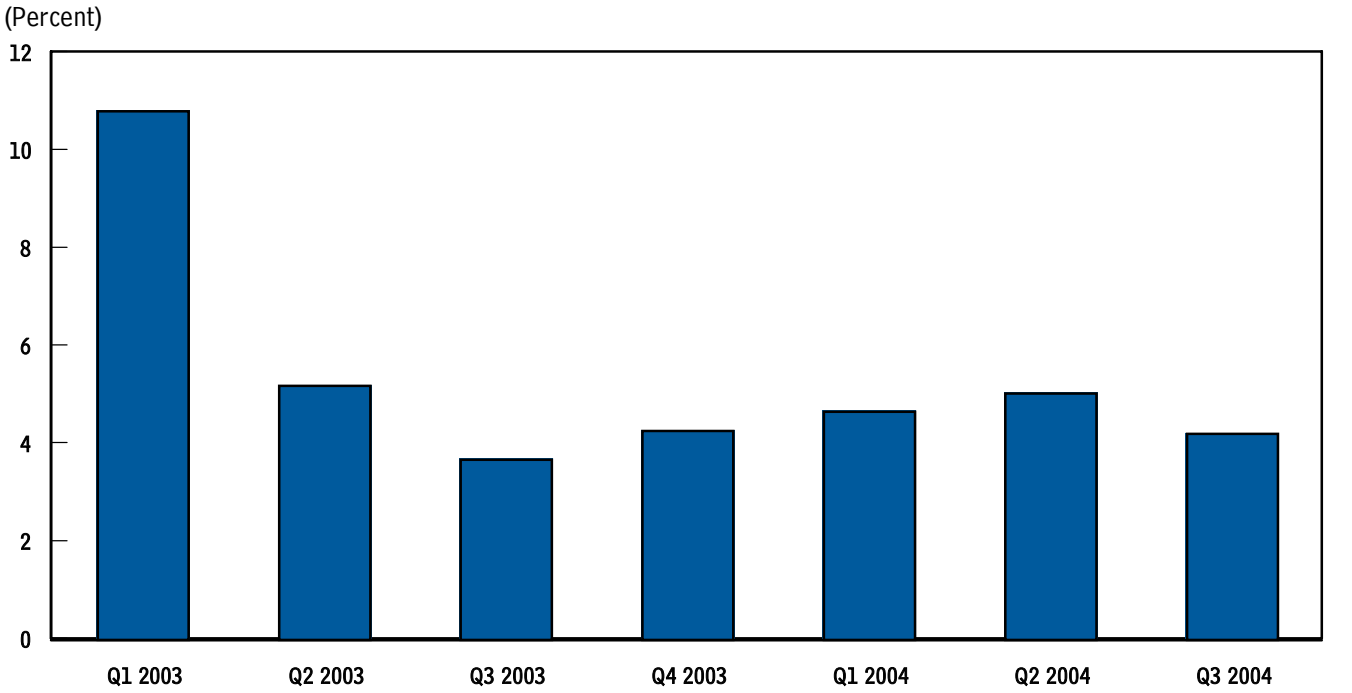
22. See Marsh Inc., "As Costs Come Down, Businesses Warm to Terrorism Insurance—One Firm in Three Buys Coverage" (press release, New York, May 10, 2004). Also see Marsh Inc., *Marketwatch: Property Terrorism Insurance 2004*. Other surveys show rates stabilizing in early 2004. In a survey by the Council of Insurance Agents and Brokers, more than half of respondents reported no change in premium rates for terrorism insurance in the first quarter of 2004, but slightly more firms reported rate increases than decreases. Council of Insurance Agents and Brokers, "Commerical Property/Casualty Market Continues to Ease During First Quarter of 2004, CIAB Survey Shows" (press release, Washington, D.C., April 19, 2004).

23. Marsh Inc., *Marketwatch: Property Terrorism Insurance Update—3rd Quarter 2004* (New York: Marsh & McLennan, December 2004).

24. In general, purchases of insurance for catastrophes are more price sensitive than purchases of basic insurance; see Martin F. Grace, Robert W. Klein, and Paul R. Kleindorfer, "Homeowners Insurance with Bundled Catastrophe Coverage," *Journal of Risk and Insurance*, vol. 71, no. 3 (2004), pp. 351-379.

Figure 1.

Premium for Terrorism Coverage as a Percentage of the Premium for Property Insurance



Source: Congressional Budget Office based on survey data from insurance broker Marsh Inc.

Notes: The survey whose data are shown here covers Marsh clients, which tend to be drawn from the 5,000 largest firms. Thus, small firms may be underrepresented in the results.

The first quarter of 2003 was the first real opportunity for insurance companies to provide terrorism coverage under the Terrorism Risk Insurance Act, but the Treasury was still implementing the legislation. Marsh cautions that data for that quarter may not be comparable with later results.

The cost of terrorism insurance fell throughout the period shown in this figure, but so did the cost of property insurance. In the more-recent quarters, property insurance costs fell faster than terrorism insurance costs, causing the slight upward trend after the third quarter of 2003.

26 percent in the third quarter of 2003 (see Figure 3).[25] Another survey found that 57 percent of commercial property owners purchased terrorism insurance in the third quarter of 2004 versus 24 percent in early 2003.[26] A majority of firms with terrorism coverage are now purchasing insurance for events not covered by TRIA, including acts of terrorism by domestic groups.[27]

25. Marsh Inc., *Marketwatch: Property Terrorism Insurance Update—3rd Quarter 2004*. Companies renew their insurance policies throughout the year. The Marsh survey covered 754 companies that renewed their property policies in the third quarter of 2004. Quarterly results can be volatile because of changes in the sample. The survey includes Marsh's clients, most of which are drawn from the largest 5,000 firms. Consequently, the sample population generally does not include small companies. Some evidence suggests that smaller companies are more likely to buy terrorism coverage than larger firms are. See R. Glenn Hubbard and Bruce Deal, *The Economic Effects of Federal Participation in Terrorism Risk* (study prepared by Analysis Group Inc. for the insurance industry, September 14, 2004), available at www.iii.org/media/lateststud/TRIA/.

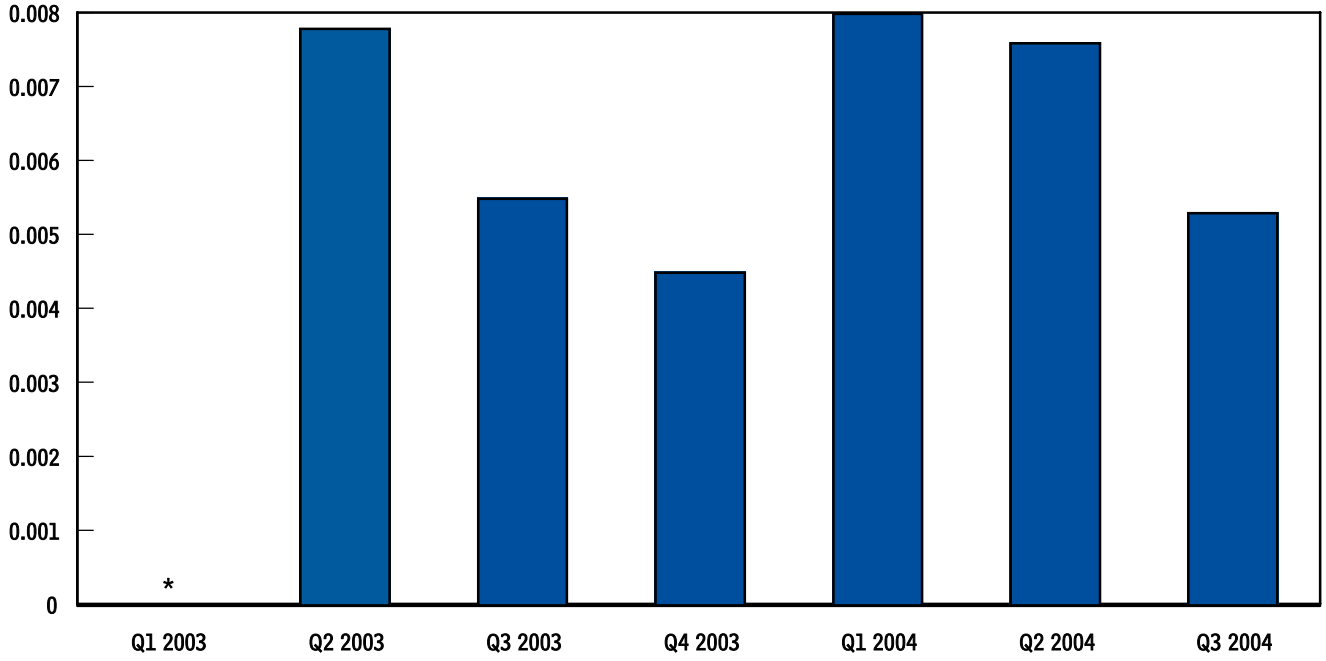
26. Those numbers come from a survey by insurance broker Aon Corporation of 500 of its clients. See Aon Corporation, *Terrorism Risk Management and Risk Transfer Market Overview* (New York: Aon Corp., December 2004), pp. 8-10, available at www.aon.com/about/publications/issues/2004_global_terrorism_wp.pdf.

27. More than 75 percent of the companies that bought terrorism insurance in the third quarter of 2004 purchased TRIA coverage plus coverage for noncertified events; see Marsh Inc., *Marketwatch: Property Terrorism Insurance Update—3rd Quarter 2004,* p. 7.

Figure 2.

Median Annual Premium for Terrorism Coverage

(Percentage of total insured value)



Source: Congressional Budget Office based on survey data from insurance broker Marsh Inc.

Notes: * = not available.

The survey whose data are shown here covers Marsh clients, which tend to be drawn from the 5,000 largest firms. Thus, small firms may be underrepresented in the results.

Premiums for both terrorism insurance and property insurance fell during the period shown in this figure; however, for most of the period, property insurance rates fell faster. As rates fell, firms purchased more-comprehensive terrorism coverage. That more-comprehensive coverage pushed up premiums measured as a percentage of total insured value.

Rates of coverage vary by region. Among large companies, they tend to be highest in the Northeast and Midwest (over 50 percent for the past 12 months) and lowest in the West (34 percent), where risk is presumed to be lowest.[28] Coverage also varies by financing source. For example, nearly all of the properties that are financed by commercial mortgage-backed securities have terrorism coverage (see Box 2 on page 10). Moreover, effective rates of coverage may be higher than surveys indicate because the surveys do not reflect terrorism insurance that is implicitly included in certain policies—such as workers' compensation policies and those for losses from fires—because of state regulations (see Box 3 on page 11).

As for companies that do not buy terrorism coverage, surveys suggest that most of them do not consider themselves potential terrorist targets.[29] (Coverage is higher in cities thought to be at greatest risk—such as New York, Washington, Chicago, and San Francisco—than in other areas despite higher premiums in those cities.) Firms might choose to forgo coverage for other reasons as well. Surveys suggest that pricing and a company's ability to tolerate some risk are factors in the decision not to purchase terrorism coverage.[30] Moreover, to the extent that firms' shareholders hold diversified portfolios, they may place little value on losses to specific companies. If some

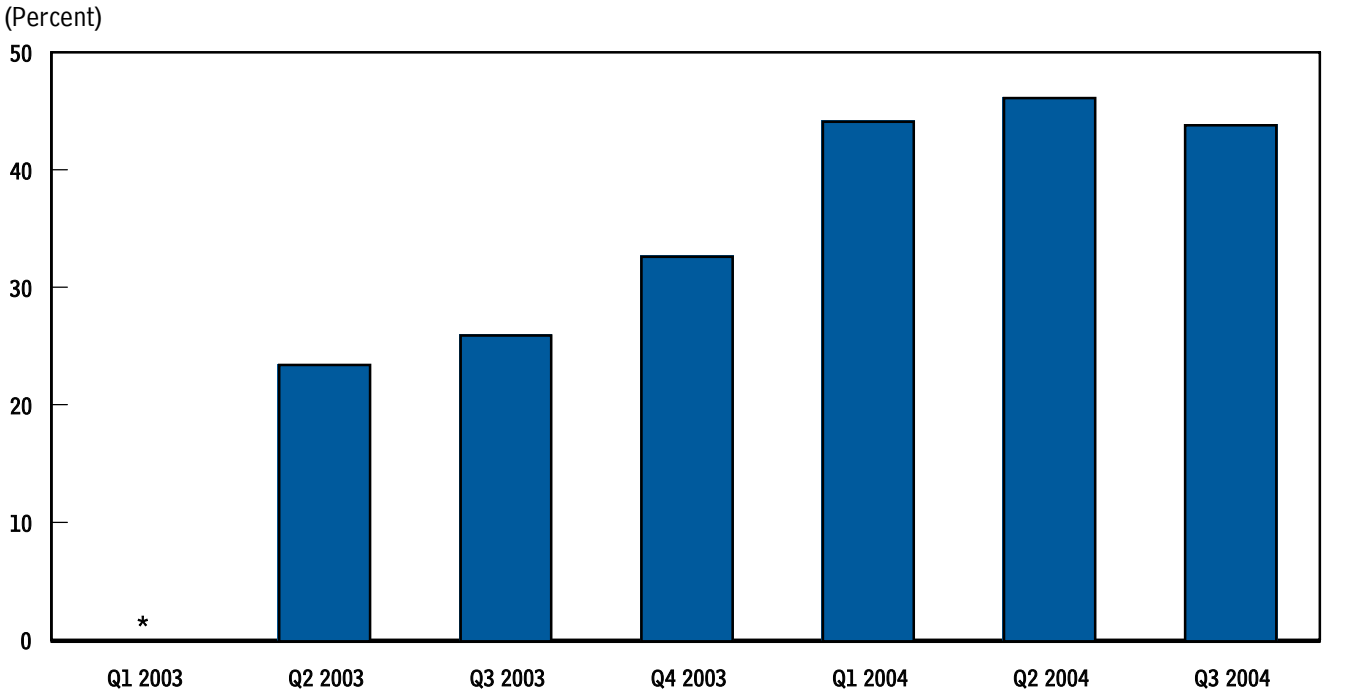
28. Marsh Inc., *Marketwatch: Property Terrorism Insurance Update—3rd Quarter 2004*. A smaller survey showed coverage to be highest in the South (84 percent); see Aon Corporation, *Terrorism Risk Management and Risk Transfer Market Overview.*

29. See Kunreuther, Michel-Kerjan, and Porter, *Assessing, Managing and Financing Extreme Events*.

30. See, for example, the National Alliance and Risk and Insurance Management Society May 2004 Terrorism Survey, which covered 113 members and visitors to the society's Web site.

Figure 3.

Percentage of Companies Purchasing Terrorism Coverage



Source: Congressional Budget Office based on survey data from insurance broker Marsh Inc.

Notes: * = not available.

The survey whose data are shown here covers Marsh clients, which tend to be drawn from the 5,000 largest firms. Thus, small firms may be underrepresented in the results.

firms have rationally decided that the costs of buying terrorism coverage outweigh the benefits, then full coverage may not be a desirable policy goal (see Box 4 on page 12).[31]

Economic Effects and the Cost of TRIA

TRIA was explicitly designed to minimize the short-term economic effects of the risk of terrorism, at some expected cost to taxpayers. Whether it has succeeded in doing so is difficult to determine. Although no claims have been filed under TRIA, administering the program is expected to cost taxpayers $14 million over the 2003-2005 period. Moreover, the program exposes taxpayers to tens of billions of dollars in possible liabilities. In addition, the TRIA program may be hurting the economy in the longer term by delaying the private sector's adjustment to a continuing risk of terrorism.

Short-Term Macroeconomic Effects

TRIA was created as a temporary program to avoid a contraction of economic activity.[32] In particular, by increasing the availability and lowering the price of terrorism insurance, the program was intended to keep commercial construction projects moving forward. Assessing the macroeconomic effects of TRIA is difficult because it is hard to know how the economy would have performed in the absence of the law. For example, the extent to which commercial construction would have declined because builders could not obtain financing is uncertain. Surveys

31. For an analysis of the demand for terrorism insurance, see Smetters, "Insuring Against Terrorism." Although the United States has not mandated coverage, some countries, such as France, have done so. See Appendix A and Kunreuther, Michel-Kerjan, and Porter, *Assessing, Managing and Financing Extreme Events*, pp. 27-28.

32. Jeffrey R. Brown, Randall S. Kroszner, and Brian H. Jenn, "Federal Terrorism Risk Insurance," *National Tax Journal*, vol. 55, no. 3 (September 2002), pp. 647-657.

Box 2.

Terrorism Insurance for Commercial Mortgages

The demand for insurance coverage is high in the market for commercial mortgages because of requirements imposed by third parties, especially credit-rating agencies. For example, Moody's generally requires terrorism coverage in order for a commercial mortgage-backed security (CMBS)—which groups the underlying cash flows from mortgages on various properties into a bond—to receive the agency's highest rating, Aaa.[1] Requirements also vary depending on the investor and the servicer. (Servicers act as intermediaries, collecting principal and interest payments from borrowers and handling defaults.) According to an industry survey, nearly all of the balances being serviced for CMBSs—the largest segment of the commercial/multifamily mortgage market—were required to have terrorism insurance in place, whereas just 28 percent of the balances held as whole loans by commercial banks and savings and loan institutions required terrorism insurance.[2] In one recent deal, involving a $1.3 billion CMBS composed of 106 loans and 120 properties (including a number of retail shopping malls across the country), 99.7 percent of the balance underlying the CMBS had terrorism insurance in place.[3]

An industry survey of $656 billion in commercial/multifamily loans found that investors or servicers required terrorism insurance on $616 billion, or about 94 percent, of that debt.[4] Terrorism insurance was actually in place for about $548 billion, or 84 percent.[5] Such widespread terrorism coverage for commercial mortgages suggests that there is a substantial private-sector supply of terrorism insurance.

1. Aaa bonds are supposed to have a default rate of about one in 10,000, or 0.01 percent, over 10 years. Daniel B. Rubock, *CMBS: Moody's Approach to Terrorism Insurance After the Federal Backstop*, Structured Finance Special Report (New York: Moody's Investors Service, January 6, 2003).
2. Mortgage Bankers Association, "More Than $400 Billion of Commercial/Multifamily Debt at Risk for Loss of Terrorism Risk Insurance Without Extension of TRIA 'Make-Available' Provision" (press release, Washington, D.C., June 2, 2004), available at www.mortgagebankers.org/news/.
3. Standard & Poor's, "Presale: J.P. Morgan Chase Commercial Mortgage Securities Corp., Series 2004-CIBC8," *Ratings Direct*, March 16, 2004.
4. Mortgage Bankers Association, "More Than $400 Billion of Commercial/Multifamily Debt at Risk." The survey sampled about 123,000 loans, with an average size of $5.3 million, out of the total commercial/multifamily mortgage market of about $2 trillion. Commercial banks and savings and loans were minimally represented in the survey and thus do not greatly affect the overall results.
5. When coverage is required but not in place, servicers seldom resort to litigation to require it. Most servicers prefer to work with borrowers to obtain coverage, although some will purchase it themselves and then bill borrowers for the cost.

indicate that in the six months following September 11, banks did not significantly tighten their commercial-lending requirements in response to the shortage of terrorism insurance, but there is little other evidence from before TRIA was enacted.[33] (In part, commercial-lending requirements may have stayed the same because firms have alternative ways of spreading risk besides insurance; see Box 5 on page 13.)

After TRIA's enactment, some recovery in retail construction occurred.[34] But the law appears to have had little measurable effect on office construction, employment in the construction industry, or the volume of commercial construction loans made by large commercial banks. Various factors complicate that assessment, however: the ef-

33. See Board of Governors of the Federal Reserve System, *Senior Loan Officer Opinion Survey on Bank Lending Practices* (April 2002), available at www.federalreserve.gov/boarddocs/snLoanSurvey/200205/default.htm. Also see Congressional Budget Office, *Federal Reinsurance for Disasters*, pp. 28-30.
34. Brown and others, "An Empirical Analysis of the Economic Impact of Federal Terrorism Reinsurance," pp. 647-657.

Box 3.

State Regulations That Affect Terrorism Insurance

Various state regulations limit insurers' ability to restrict coverage for losses from terrorist attacks and to set risk-adjusted rates for some types of insurance. If the Terrorism Risk Insurance Act (TRIA) expired after 2005, those restrictions could decrease the supply of private-sector terrorism insurance in the long run by discouraging insurers from issuing it.

State regulations dealing with coverage have implications both for the current marketplace and for the future if TRIA expired. For example, even before that law was enacted, five states—New York, California, Florida, Georgia, and Texas—required terrorism coverage to be included in commercial property and casualty insurance. Unless changed at the state level, those requirements would continue to apply after TRIA's expiration. Moreover, even today, companies that do not purchase terrorism coverage could find some of their terrorism-related claims covered by other types of insurance. In 23 states (including California, New York, and Illinois), property insurance covers losses from fires regardless of the cause of the fire.[1] Moreover, 49 states require workers' compensation policies to cover occupational injuries regardless of their cause. (Pennsylvania has an exception for war-related losses.) Thus, state regulations result in terrorism coverage for some claims whether or not a federal requirement exists.

State regulations also limit insurers' ability to set prices for their exposure to terrorism risk in the workers' compensation market. The portion of workers' compensation premiums that reflects terrorism generally does not vary geographically within a state or by the amount of risk.[2] Coverage is virtually mandatory and is guaranteed through state workers' compensation funds or assigned risk mechanisms.[3] If many workers are injured in a single event, losses can be high. Thus, concentrated risks—which can threaten insurers' solvency—generally cannot be priced in the primary workers' compensation market, even though a reinsurer would most likely take that risk into consideration by charging higher premiums for reinsurance. Those regulations limit the private supply of workers' compensation insurance.

1. General Accounting Office, *Terrorism Insurance: Implementation of the Terrorism Risk Insurance Act of 2002*, GAO-04-307 (April 2004), p. 26.

2. Towers Perrin, *Workers' Compensation Terrorism Reinsurance Pool Feasibility Study* (April 14, 2004), available at www.towersperrin.com/tillinghast/publications/reports/WC_Terr_Pool/WC_Terr_Pool_Study.pdf.

3. Employers that are considered high-risk may have problems obtaining workers' compensation insurance in the private market. How such cases are handled varies from state to state. Some states have their own workers' compensation funds, which accept all risks rejected by private insurers. Other states rely on assigned risk plans and allocate high-risk employers to insurers on the basis of an insurer's market share.

fects of the 2001 recession and of the investment bubble of the late 1990s could be masking positive macroeconomic effects of TRIA.

Cost to Taxpayers

As of December 1, 2004, no claims have been incurred under TRIA, but that does not mean that the program has no cost. Indeed, the cost—in terms of risk and uncertainty—of having the federal government provide terrorism reinsurance is approximately the same as the cost of having the private sector provide it. With a federal program, however, that cost is shifted from shareholders of insurance companies and owners of commercial properties to taxpayers. The shift in cost would occur even if surcharges ultimately offset all cash outlays under TRIA.

The Congressional Budget Office (CBO) estimates the expected value of federal outlays from TRIA to be $630 million over the 2005-2015 period and the value of governmental receipts from surcharges to be $320 million

Box 4.

Does Low Coverage Signal a Market Failure?

Even though the percentage of companies purchasing terrorism insurance has been rising, roughly one in two large firms still lacks such insurance. That low rate of coverage most likely results from a rational weighing of the costs and benefits of purchasing insurance rather than from some failure in the market. Lack of available coverage and imperfect information could be signs of a market failure; however, those factors do not appear to explain the pattern of purchases and prices in the market for terrorism insurance.

The existing evidence suggests that coverage is available. In particular, high coverage rates in the market for commercial mortgage-backed securities (as described in Box 2) support the belief that the supply is ample in the primary market. Moreover, competition should force insurers to pass the subsidies provided by the Terrorism Risk Insurance Act through to policyholders, so current premiums for terrorism coverage should be below market rates. Insurance companies and brokers might be keeping a small portion of the subsidy—an outcome that is more likely if recent allegations of bid-rigging by insurers and brokers are substantiated.[1]

Property owners appear to be making rational decisions about terrorism coverage on the basis of publicly available information. (The government may have better information about risk that remains classified.) Higher coverage in areas at greater risk supports that view. However, if purchases are being held down by the expectation that the federal government would aid uninsured parties after a terrorist attack or by underestimates of risk, then coverage may be too low.

1. Allegations of bid-rigging by insurers and by the largest insurance broker, Marsh & McLennan, suggest that commercial insurance customers in general may not have fully benefited from competition in the market. See Monica Langley and Theo Francis, "Insurers Reel from Spitzer's Strike," *Wall Street Journal*, October 18, 2004, p. 1.

over the same period.[35] (Expected-value estimates reflect CBO's expectation of payments during the period based on the probabilities of various outcomes, from losses of zero up to very large amounts.) The outlay estimate does not include any charge for the risk and uncertainty borne by taxpayers.[36] Thus, it is less than the likely market price for such reinsurance.

Unlike CBO's baseline, the President's budget (which is prepared by the Office of Management and Budget) does not report expected losses from insurance claims for the TRIA program. Because of the uncertainty surrounding losses from and frequency of future terrorist attacks, the President's budget shows only the administrative costs of the program.[37]

Long-Term Effects

An increase in risk from terrorism is in some senses analogous to an increase in risk from natural disasters: it raises the costs and lowers the value of some types of activities in high-risk areas. By analogy, TRIA is equivalent to a policy of subsidizing property and casualty insurance in an area that appears to have an especially high risk of natural disasters. If the increase in risk is only temporary or akin to a once-in-100-year phenomenon, then a federal

35. Those are the amounts included in CBO's January 2005 baseline, which projects future federal spending and revenues under current laws. (CBO did not prepare a cost estimate for the Terrorism Risk Insurance Act.) Although the TRIA program expires at the end of 2005 under current law, the estimate includes costs in later years for several reasons. First, payments for property losses can be delayed for years because of disputes, such as those over business-interruption claims, which can be contentious. Second, certain casualty claims are paid over several years. The chief example is workers' compensation claims, which are paid for years following an injury.

36. For an analysis of the cost of risk that the government assumes, see Congressional Budget Office, *Estimating the Value of Subsidies for Federal Loans and Loan Guarantees* (August 2004), pp. 9-15.

37. *Budget of the United States Government, Fiscal Year 2004: Appendix*, pp. 769-770.

Box 5.

Diversification as an Alternative to Insurance

After the attacks of September 11, 2001, there was little systemic evidence that problems in the insurance market had spilled over to affect financing of construction projects. One explanation is that lenders financing such projects can reduce their risk through loan diversification as well as insurance.[1] Moreover, real estate investment trusts, which are essentially mutual funds for real estate holdings, and commercial mortgage-backed securities (CMBSs), which group the underlying cash flows from mortgages on various properties into bonds, allow lenders to shed most of their credit risk—and investors to diversify their holdings—at low cost.

If terrorism insurance is in short supply, meeting the criteria that credit-rating agencies set for investment-grade CMBSs may affect how properties are combined into securities. In particular, single-property CMBSs will be less attractive (in the absence of federal reinsurance) because large properties—particularly landmark properties—are thought to be at greater risk from terrorists than other properties are. In addition, Moody's is more likely to rate a security lower if a large loan represents more than 20 percent of that security, thus creating the potential for a concentrated loss from a terrorist act. When terrorism insurance is lacking, adjustments to the capital structure of a CMBS might be required to maintain a high credit rating. For example, the developers might be required to put more equity into the properties.

In the wake of September 11, two of the three rating agencies, Moody's and Fitch Ratings, did downgrade some CMBSs because of a lack of terrorism coverage.[2] The third, Standard & Poor's, did not downgrade any CMBSs because of a lack of coverage, but it disclosed whether terrorism coverage was in place for the properties that made up a security.[3]

1. See Kent Smetters, "Insuring Against Terrorism: The Policy Challenge" (paper prepared for the January 8-9, 2004, Conference of the Brookings-Wharton Papers on Financial Services, February 2, 2004, draft), available at http://irm.Wharton.upenn.edu/WP-Insuring-Smetters.pdf.

2. Moody's did not take any rating actions on CMBSs rated below Aa because, below that level, the risk from uninsured terrorism losses was seen as being heavily outweighed by the standard risks that such mortgages entail. Daniel B. Rubock, *CMBS: Moody's Approach to Terrorism Insurance After the Federal Backstop*, Structured Finance Special Report (New York: Moody's Investors Service, January 6, 2003).

3. Standard & Poor's believed that TRIA's "make available" provision mandated insurers to cover terrorism risk and thus worsened their risk profile. The agency also believed that insurers did not know how to price terrorism insurance and that risk models could lull them into a "false sense of complacency." See Standard & Poor's, "Little Ratings Cheer for Insurers in New Terrorism Risk Legislation," *Ratings Direct*, November 26, 2002.

program to provide low-cost insurance could be justified as a means of avoiding an expensive and unnecessary effort to reduce losses.

If the increase in risk is long-lived, however, such a federal program could be costly to the economy because it could further delay owners of assets from making adjustments to mitigate their risk and reduce potential losses. Since July 2004, when the 9/11 Commission published its report, a consensus appears to have emerged that the current increased risk of terrorism is likely to continue for years. With a sustained change in the risk of loss, spreading that risk through insurance is only part of an economically efficient response. Taking steps to mitigate risk—such as moving operations to safer locations, installing better security systems, establishing disaster-recovery procedures, and setting up systems to protect computerized information—is also important.

There is relatively little evidence that firms have been making additional investments since September 11 to improve their security and avoid losses.[38] One possible reason is that firms are only gradually and reluctantly

38. See Congressional Budget Office, *Homeland Security and the Private Sector* (December 2004).

concluding that the terrorism threat will persist. Other reasons may be that some initial measures that firms are taking (such as decentralizing certain operations) are not easily tracked or that firms needed time to evaluate the cost-effectiveness of different measures. But a possible explanation is that subsidized insurance is shielding companies from facing the costs of their exposure to risk. (Because any postevent surcharges levied under TRIA would be uniformly assessed on all commercial policyholders, rather than only on holders of terrorism coverage, they do not provide an incentive for firms to reduce losses.)

If the federal government continued to subsidize terrorism insurance, it would probably contribute to deferring the private-sector's long-term adjustment to the increase in risk.[39] Less adjustment means that losses from future attacks would be greater than would otherwise be the case. Experience with other federally subsidized insurance programs suggests that their economic effects can be substantial. For example, federal flood insurance encourages development in areas prone to flooding and discourages both relocation and measures to prevent floods.[40] In that way, federal programs can increase losses from hazards.

The extent to which TRIA may actually be reducing efforts to mitigate risk is unknown. However, some evidence suggests that the law is having an effect in another area: slowing the development of alternative approaches to spreading risk, such as mutual reinsurance pools and catastrophe bonds (see Box 6 and Appendix B).[41]

Policy Implications

Three options for the future of the TRIA program have been under discussion in the Congress. One is to allow the program to expire at the end of calendar year 2005, as scheduled under current law. A second option is to extend it as is. For example, H.R. 4772, which was introduced in the House on July 7, 2004, would have extended the TRIA program in its current form and left individual insurers' deductibles and the industry retention level unchanged. A third option is to modify TRIA. For example, H.R. 4634, which was reported by the House Committee on Financial Services on September 29, 2004, would have continued the program through 2007, raised individual insurers' deductibles from 15 percent this year to 20 percent in 2007, increased the industry retention level from $15 billion now to $20 billion in 2007, and extended reinsurance coverage to providers of group life insurance. CBO estimated that on an expected-value basis, that legislation would increase outlays by $1.3 billion and receipts by $480 million over the 2005-2014 period (for more details of that estimate, see Box 7).[42]

The Administration has not announced a policy recommendation for the TRIA program. It is waiting for the Treasury to complete an assessment of the law and of the industry's likely capacity to offer terrorism insurance in

39. In general, firms will weigh the benefits of insurance against the costs of risk-mitigation efforts. By lowering the costs of insurance, the TRIA program tilts a firm's decision away from expenditures on self-protection. However, some analysts see that tilting as desirable because firms do not take into account that their spending on risk mitigation will increase the risk faced by other firms, by making those other firms relatively more attractive targets for terrorists. Thus, investments in risk mitigation can potentially have negative side effects (or externalities, as economists call them). See Darius Lakdawalla and George Zanjani, *Insurance, Self-Protection, and the Economics of Terrorism*, Working Paper No. 9215 (Cambridge, Mass.: National Bureau of Economic Research, September 2002).

40. Although the flood insurance program's subsidies discourage some preventive measures, the program includes significant mitigation requirements. For estimates of flood insurance risk borne by taxpayers, see the statement of JayEtta Z. Hecker, Director, Physical Infrastructure, General Accounting Office, before the Subcommittee on Housing and Community Opportunity of the House Committee on Financial Services, published as General Accounting Office, *Flood Insurance: Challenges Facing the National Flood Insurance Program*, GAO-03–606T (April 1, 2003).

41. Jeffrey R. Brown and others, "An Empirical Analysis of the Economic Impact of Federal Terrorism Reinsurance," pp. 861-898. Also see Anne Gron and Alan O. Sykes, *Terrorism and Insurance Markets: A Role for the Government As Insurer?* Working Paper No. 155 (Chicago: University of Chicago Law School, 2002).

42. Before TRIA was enacted, insurers had proposed another option: having the federal government financially support private reinsurance pools for terrorism risk, as some European countries have done. However, that approach leads to long-term government involvement and is not being actively considered by U.S. policymakers. For other analyses of options, see Debra J. Roberts, *TRIA: Where Do We Go from Here?* (Washington, D.C.: Center on Federal Financial Institutions, November 16, 2004), available at www.coffi.org/pubs/TRIAprimerp3.pdf; and Lloyd Dixon and others, *Issues and Options for Government Intervention in the Market for Terrorism Insurance* (Santa Monica, Calif.: RAND Center for Terrorism Risk Management Policy, 2004), available at www.rand.org/publications/OP/OP135/.

Box 6.

Mutual Reinsurance Pools

Reinsurance pools allow insurers to share their risks with other members of the pool. Typically, an insurer is financially responsible for some initial level of losses, but the entire pool covers some or all of the losses above that level. In return for sharing losses, the other members of the pool receive a portion of the insurer's premiums. Thus, pools provide an alternative to reinsurance. The major difference is that pool members may be hit with surcharges after an event that exhausts the pool's resources.

The United Kingdom and other nations have formed government-backed mutual reinsurance pools for terrorism risk (see Appendix A). However, U.S. insurers could also form such pools without government backing.[1] Although reinsurance pools would not create new capital in the insurance industry, they would expand the industry's ability to write coverage and absorb losses by increasing the diversification of risk. Mutual reinsurance pools might be particularly well suited to the risk of terrorism because they typically set premiums on the basis of relative risk and rely on assessing surcharges on pool members after the fact to cover shortfalls. Consequently, estimates of the level of terrorism risk would not be needed.

In early 2004, a group of 14 insurers (including the Hartford Financial Services Group and American International Group) considered forming a mutual reinsurance pool to cover workers' compensation losses from terrorist acts, including nuclear, biological, chemical, and radiological attacks.[2] Estimates predicted that the pool could have reduced most members' risk by more than 50 percent. (Pooling risk tightens the probability distribution of losses and thus reduces financial risk; it does not change expected losses.) Projections also showed that a mutual reinsurance pool for workers' compensation could handle losses from an event similar in size to the September 11 attacks on the World Trade Center but not worst-case scenarios involving biological, chemical, or nuclear contamination.[3]

The main reason that insurers did not proceed with the mutual reinsurance pool was fear that, even with the pool, a catastrophic act of terrorism could exhaust the capital backing workers' compensation insurance. Uncertainty about the future of the federal terrorism reinsurance program was another factor. However, if that program expires as scheduled, a mutual reinsurance pool to spread the terrorism risk facing workers' compensation insurance may look more attractive to insurers.

1. Mutual insurance pools are used in the United States in surety finance. The pools are an alternative to purchasing surety bonds, which insurers sell to oil and gas companies to meet their financial-assurance requirements for reclamation after oil and gas activities. Two states have formed bond pools that mutualize participants' risk, and the mining industry has expressed interest in expanding the use of bond pools. See Congressional Budget Office, *Bonding for Reclaiming Federal Lands* (October 2003).

2. Towers Perrin, *Workers' Compensation Terrorism Reinsurance Pool Feasibility Study* (April 14, 2004), available at www.towersperrin.com/tillinghast/publications/reports/WC_Terr_Pool/WC_Terr_Pool_Study.pdf.

3. Workers' compensation claims from the September 11 attacks are estimated to total about $1.8 billion. Payouts from the federal September 11th Victim Compensation Fund reduced those claims by about $200 million. Personal communication to the Congressional Budget Office by Robert Hartwig, Insurance Information Institute, July 22, 2004.

Box 7.

CBO's Estimate of the Costs of the Terrorism Insurance Backstop Extension Act of 2004

Extending the Terrorism Risk Insurance Act of 2002 (TRIA) under the terms envisioned by the Terrorism Insurance Backstop Extension Act of 2004 (H.R. 4634) would expose federal taxpayers to tens of billions of dollars in liabilities for two more years. For any single year, the Congressional Budget Office (CBO) has no basis for estimating the likelihood of terrorist attacks or the amount of insured damage they might cause. Instead, its estimate of the cost of enacting H.R. 4634 reflects how much, on average, the government could be expected to pay insurers.[1]

On the basis of discussions with insurers and information provided by the insurance industry, CBO estimates that the expected average annual loss subject to coverage under TRIA would be about $1.5 billion, including $100 million from the inclusion of group life insurance policies. That estimate assumes that in most years, terrorist attacks would cost less than $1.5 billion. There is a significant assumed probability—approaching 50 percent—that no terrorist attacks that would be covered by TRIA would occur in a given year. Further, CBO assumes for that estimate that attacks similar in scale to the losses sustained on September 11, 2001, are likely to occur very rarely.

On an expected-value basis, CBO estimates that enacting H.R. 4634 would increase direct spending by about $1.1 billion over the 2005-2009 period and by $1.3 billion over 10 years. The Treasury Department would recoup some or all of those costs through surcharges, which would increase governmental receipts by about $70 million through 2009 and $480 million over 10 years. Because surcharges can be imposed for many years, CBO expects that the increase in spending would eventually be offset to a greater extent than that.

The Treasury would need to charge insurers premiums of almost $700 million in both calendar years 2006 and 2007 just to offset the government's average annual loss from providing the reinsurance, CBO estimates. However, those premiums would not compensate taxpayers for the risk they were bearing.

Although this estimate reflects CBO's best judgment on the basis of available information, actual costs could vary greatly from the estimate.

1. Congressional Budget Office, *Cost Estimate for H.R. 4634, Terrorism Insurance Backstop Extension Act of 2004* (November 19, 2004).

the absence of federal backing.[43] That assessment, which was mandated by TRIA, is due to be delivered to the Congress by June 30. As part of the analysis, the Treasury is conducting comprehensive surveys of insurers, reinsurers, and policyholders, which will examine the effects of changes in TRIA's insurer deductibles in successive years of the program. Those surveys are intended to provide a broader and more dynamic view of the marketplace than existing surveys by private firms do.[44] The Treasury's assessment could reveal whether there is evidence of long-

43. See the testimony of Wayne A. Abernathy, Assistant Secretary for Financial Institutions, Department of the Treasury, before the Subcommittee on Capital Markets, Insurance, and Government Sponsored Enterprises and the Subcommittee on Oversight and Investigations of the House Committee on Financial Services, April 27, 2004.

44. Some of the information being collected includes the cost of terrorism coverage compared with the cost of total insurance coverage within eligible types of insurance, basic financial data, insurance deductibles and limits for terrorism coverage, the use of reinsurance and self-insurance, and types of risk-management programs. The Treasury's first survey collected data for 2002 (to establish a base point prior to TRIA's enactment) and for 2003. The second survey, covering 2004, has been sent out. The final survey will be sent in early 2005. Personal communication to the Congressional Budget Office from Lucy Hoffman, Department of the Treasury, November 24, 2004.

term failures in the insurance market that are not apparent from current information.

Pros and Cons of Letting TRIA Expire

Two significant changes have occurred in the years since TRIA was enacted that have implications for future policy. First, there is a growing perception that the risk of terrorism is likely to remain high. That development suggests that property owners and businesses need to take measures to reduce their exposure to that risk. They would have a stronger incentive to take such measures if the insurance subsidies conveyed through TRIA were reduced or eliminated. Second, the underwriting capacity of the insurance industry has recovered greatly. That change implies that private insurers can play a bigger role in providing terrorism coverage.

If TRIA expired as planned, premiums for terrorism insurance would be likely to rise, perhaps substantially. Not only would the end of federal subsidies drive up rates in the private sector, but the uncertainty associated with the risk of terrorism could lead insurers to charge higher premiums than they would if they had more-precise estimates of the probability, frequency, and size of possible losses, according to some analysts.[45] However, the increase in premiums would encourage insurers and owners of assets to adjust to the higher level of terrorism risk.[46] That adjustment, which would include more mitigation efforts, should reduce expected losses from terrorist attacks.

In the absence of federal reinsurance, insurers would be looking to use the private-sector reinsurance market to shed some of their terrorism risk and thereby limit their risk of catastrophic losses and insolvency. Reinsurers covered about 60 percent to 80 percent of the losses from the September 11 attacks, according to one estimate.[47] In 2004, the capacity of the private terrorism reinsurance market remained low—between $4 billion and $6 billion, by industry estimates.[48] In the face of higher premiums, however, mutual reinsurance pools might be a feasible source of increased coverage, especially for workers' compensation (see Box 6 on page 15).[49]

The economic effects of letting TRIA expire are unclear. But the economy is stronger now than it was in 2001 and 2002 and therefore is better able to handle an increase in costs for terrorism insurance. A study sponsored by the insurance industry concluded that failing to extend TRIA would have adverse effects on economic growth and employment, even if another terrorist attack did not occur.[50] The study predicted that economic growth would be slowed because higher premiums for property insurance (and a resulting decrease in property values) would raise operating costs for businesses and because higher premiums for workers' compensation would increase labor costs. However, the study's results depend heavily on its particular assumptions; adverse effects would be smaller under a more plausible set of assumptions (see Box 8). The study also does not take into account TRIA's cost to taxpayers and its potentially adverse impact on the economy's long-term adjustment to a higher level of terrorism risk.

More fundamentally, letting TRIA expire would not increase the expected cost of terrorism to the economy but rather would change who bore it. Only if the government can bear terrorism risk at a lower cost than private firms and insurers will costs rise with the expiration of TRIA. However, there is no evidence to suggest that the government can bear terrorism risk more efficiently than others can. Currently, the cost of terrorism risk is being shared by taxpayers and by private parties—insurers and the owners of assets. If TRIA expired as scheduled, more of the cost would be borne by private firms and insurers. (Because uninsured losses can be deducted from corporate income taxes, taxpayers will always bear some of the losses.)

45. Kunreuther, Michel-Kerjan, and Porter, *Assessing, Managing and Financing Extreme Events*.

46. See Rawle O. King, *Insurance and Emergency Preparedness: The 9/11 Commission Recommendations*, CRS Report for Congress RL32646 (Congressional Research Service, October 25, 2004).

47. Marsh Inc., *Marketwatch: Property Terrorism Insurance 2004*, p. 9.

48. Private communication to the Congressional Budget Office by Cynthia Lamar, Vice President and Assistant General Counsel, Reinsurance Association of America, July 20, 2004.

49. See Howard Kunreuther and Erwann Michel-Kerjan, *Policy Watch: Challenges for Terrorism Risk Insurance in the United States*, Working Paper No. 10870 (Cambridge, Mass.: National Bureau of Economic Research, October 2004).

50. R. Glenn Hubbard and Bruce Deal, *The Economic Effects of Federal Participation in Terrorism Risk* (study prepared by Analysis Group Inc. for the insurance industry, September 14, 2004), pp. 75-85, available at www.iii.org/media/lateststud/TRIA/.

Box 8.

Estimated Economic Effects of TRIA's Expiration

A recent study estimated that expiration of the Terrorism Risk Insurance Act (TRIA) would result in a doubling of premiums for terrorism coverage, which would increase businesses' operating costs. The study also concluded that labor costs would rise to the extent that rates for workers' compensation insurance increased. Consequently, it said, economic growth would suffer: in 2008, for example, gross domestic product could be 0.4 percent lower, household net worth 0.9 percent lower, and the number of jobs 0.2 percent lower than would otherwise be the case, even in the absence of another major terrorist attack.[1] Those findings, however, appear to be on the high side of a plausible range.

The study's results hinge on assumptions about the extent to which premiums would increase and about businesses' response to those increases. First, on the basis of prices prevailing in 2002, the study assumes that the average premium for terrorism coverage would double once TRIA expired. But in 2002, the insurance industry was still in the early stages of adjusting to the shock of September 11. Today, it is better positioned to bear and price terrorism risk, which suggests that the premium increases would be smaller than assumed. Second, the model used in the study—which comes from the forecasting firm Macroeconomic Advisers—assumes that 100 percent of companies would have insurance coverage both before and after the assumed doubling of premiums. However, about 50 percent of companies have terrorism coverage today. Thus, far fewer firms would be affected by the higher prices than assumed. In addition, the higher prices would motivate more businesses to self-insure, which presumably costs less than purchasing coverage.

The study's assumption about monetary policy may magnify the short-term impact on economic activity. The study assumes that the Federal Reserve would not relax monetary policy in the face of weaker aggregate demand. But adopting an accommodative monetary policy could offset the aggregate economic effects in the short run.

The study also assumes that businesses would pay for the entire increase in premiums for workers' compensation. Macroeconomic Advisers' standard model, which is used in the study, generally assumes that part of similar employment costs are immediately shifted to workers, but that assumption was not used in this estimate. Moreover, the model implies that ultimately, all of the costs would be shifted to labor, so any negative effects on employment would most likely be temporary as well as overstated. Further, if firms could locate to less risky areas, higher operating costs might not be permanent.

The study also potentially magnifies the short-term effects of a higher cost of capital by assuming that the stock of nonresidential structures adjusts at a faster rate than is incorporated in Macroeconomic Advisers' standard model.[2] Without that alternative assumption, the short-term negative effect on the economy would be smaller than projected.

Moreover, questions remain about the degree to which higher prices for insurance would reduce investment in nonresidential structures. Investment in so-called trophy (or landmark) properties would be likely to decline. But to the extent that smaller structures—with smaller risk and hence lower costs of terrorism insurance—could substitute for trophy properties, then investment would decline by less than the model suggests.

1. The authors also estimated negative economic effects for 2006 and 2007. R. Glenn Hubbard and Bruce Deal, *The Economic Effects of Federal Participation in Terrorism Risk* (study prepared by Analysis Group Inc. for the insurance industry, September 14, 2004), available at www.iii.org/media/lateststud/TRIA/. The study was funded by the American Insurance Association, the Financial Services Roundtable, the National Association of Mutual Insurance Companies, the National Council of Compensation Insurance, the Property Casualty Insurers Association of America, and the Reinsurance Association of America.

2. The macroeconomic estimates were generated by Macroeconomic Advisers' model using the assumptions that Hubbard and Deal made about the effect of TRIA's expiration on pricing and coverage. However, for that analysis, Macroeconomic Advisers shortened the lag in its standard equation for nonresidential structures because it believed that the long lag in the standard model did not adequately capture the response of the demand for nonresidential structures to higher insurance costs.

A disadvantage of letting TRIA expire is that doing so risks a market disruption after an unexpectedly large event, as has been the pattern for natural catastrophes. In particular, reinsurance premiums would be likely to spike after a terrorist attack, and the availability of insurance and reinsurance would drop. How long that disruption would last is uncertain. But in the aftermath of catastrophic events that deplete capital, high prices and reduced availability of insurance can persist, in part because of adjustment costs and uncertainty.[51]

Reinsurers would also probably continue to exclude losses related to nuclear, biological, and chemical attacks from their coverage. That exclusion would be important mainly for the workers' compensation market, since primary insurers for that type of policy must cover loses from all causes. Potentially, insurers would be unable to diversify that catastrophic risk, at least in the near term, so rates for workers' compensation policies could rise substantially. Thus, TRIA's expiration would be likely to create transitional problems in the workers' compensation market.

Another disadvantage of letting TRIA expire is that with higher prices, the prevalence of insurance coverage would probably decline. Thus, lawmakers might find themselves providing more supplemental disaster assistance for uninsured losses following a major attack. In the case of September 11, federal assistance to businesses adversely affected by the attacks exceeded $6 billion, out of total federal aid of more than $30 billion in response to the attacks (see Appendix C).[52] Of the $6 billion for businesses, a relatively small amount—less than $1 billion—was targeted specifically to firms that lacked coverage for business-interruption and property losses.

Pros and Cons of Modifying TRIA

If the TRIA program was extended rather than allowed to expire, the government could take steps to reduce the adverse effects that the program's financial backstop has on mitigation activities. Charging premiums for federal reinsurance would help encourage the private sector to adjust to the higher level of risk. When TRIA was proposed, its supporters argued against premiums on the grounds that not charging them would have only small effects in the short run and would avoid the need to create a federal entity to set premiums. However, if the primary goal now is to prompt the economy to adjust to a continuing threat of terrorism, that goal could be accomplished by setting premiums as close as possible to expected losses. Alternatively, to ensure that private insurers and reinsurers had room to compete with the government, policymakers could set premiums higher than expected losses (in other words, add "risk loads"). In addition, gradually raising the deductibles and coinsurance percentages that insurers pay for losses would help by slowly removing the government from the market.

On the downside, such changes would mostly likely cause the amount of terrorism coverage to decline. In addition, setting actuarially fair premiums is difficult for government agencies.

51. See Kenneth A. Froot, *Risk Management, Capital Budgeting, and Capital Structure Policy for Insurers and Reinsurers*, Working Paper No. 10184 (Cambridge, Mass.: National Bureau of Economic Research, December 2003). For alternative explanations of market disruptions after catastrophic events, see Dwight Jaffee and Thomas Russell, "Markets Under Stress: The Case of Extreme Event Insurance," in Richard Arnott and others, eds., *Economics for an Imperfect World: Essays in Honor of Joseph E. Stiglitz* (Cambridge, Mass.: MIT Press, 2003), pp. 35-52; and Anne Gron and Andrew Winton, "Risk Overhang and Market Behavior," *Journal of Business*, vol. 74, no. 4 (October 2001), pp. 591-612. For a current assessment of terrorism risk and the insurance industry, see Vinay Saqi and others, *Correction: Assessing Insurers' Terrorism Risk* (New York: Morgan Stanley Equity Research, March 24, 2004).

52. Lloyd Dixon and Rachel Kaganoff Stern, *Compensation for Losses from the 9/11 Attacks* (Santa Monica, Calif.: RAND Institute for Civil Justice, November 2004), available at www.rand.org/publications/MG/MG264/.

APPENDIX

A

Terrorism Insurance Programs in Europe

Many European governments have taken an alternative approach to that of the Terrorism Risk Insurance Act. Instead of providing zero-premium reinsurance themselves, they financially back terrorism insurance and reinsurance pools created by insurers. The pools, which are a way of sharing risks among insurance companies, are typically intended to be permanent. With a pool system, individual insurers pay the first layer of claims, and the mutual reinsurance pool pays higher layers. Generally, the government picks up losses once a pool's resources are exhausted; however, the government's explicit liability is usually capped.[1]

Pools can be efficient ways to handle layers of risk that are hard to price. Some analysts believe that in the case of terrorism, the highest layers of risk—covering catastrophic losses—may be difficult to price effectively. However, pools can be sustainable if they set prices that differentiate between the relative risks of various properties. Postevent surcharges can cover some of a pool's losses, with the government assuming the catastrophic losses.

The United Kingdom's Pool Re

In 1993, the United Kingdom established a government-backed terrorism reinsurance pool—known as Pool Re (for "reinsurance")—to deal with property losses from bombings by the Irish Republican Army. After the attacks of September 11, 2001, the pool expanded its coverage of commercial property-damage and business-interruption losses to include many more risks, such as damage caused by chemical, biological, and nuclear contamination.[2] The expansion of coverage, plus the added risk of terrorism, resulted in a doubling of premiums. But insurers now know in advance that their losses will be capped, both annually and per event. Placing a cap on losses is important because it reduces uncertainty. Likewise, although the previous practice of paying rebates to member insurance companies in some years was discontinued, companies no longer face the possibility of paying surcharges after losses to Pool Re.

Coverage by and participation in the pool remain optional for insurers. However, since September 11, participation in the pool has increased. For that reason and because of the higher premiums, the pool's income from premiums grew more than threefold between 2001 and 2004, and its reserves increased by more than one-third between the end of 2001 and the end of 2003.[3]

Various facets of the pool encourage competition in the insurance market. The maximum deductible has been raised—more than tripling between 2003 and 2006—to encourage private reinsurers to reenter the market. In addition, insurers are free to set premiums for the underlying terrorism policies, which has expanded competition. Premiums are highest in the financial district of central London.

1. In the United States, Florida and California have similar state-sponsored reinsurance pools for natural disaster insurance; see Congressional Budget Office, *Federal Reinsurance for Disasters* (September 2002), pp. 35-41.

2. War risks are not insured. In addition, damage to electronic components from hacking and computer viruses is excluded because of the likely inability to prove that such damage resulted from a terrorist attack. See HM Treasury, "Government Extends Remit of Pool Re" (press release no. 73/02, London, July 23, 2002), available at www.hm-treasury.gov.uk./newsroom_and_speeches/press/2002/press_73_02.cfm. Also see HM Treasury, *Changes to the Pool Re Scheme* (summary paper, London, July 23, 2002), available at www.hm-treasury.gov.uk./media/648/AF/ACF1D0D.PDF.

3. Pool Re expected to earn £260 million (nearly $500 million) from premiums in 2004 versus £71 million in 2001. Pool Re's reserves stood at about £1.1 billion at the end of 2001 and £1.5 billion ($2.8 billion) at the end of 2003. Personal communication to the Congressional Budget Office by Steve Atkins, chief executive of Pool Re, July 21, 2004.

Other Pools

Spain has a fund to pay for losses from the March 11, 2004, bombings of several train stations in Madrid. Those attacks killed nearly 200 people and injured more than 1,500, but insured property losses were relatively small (about 35 million euros, or $47 million).[4] Spain's insurance pool, which covers losses from natural disasters as well as from terrorism, was set up in 1941 during the Spanish Civil War. Participation by insurers is mandatory. Despite paying out more than 4.2 billion euros ($5.6 billion) between 1971 and 2003—mostly to cover floods, but also to cover bombings by Basque separatists—the pool has a surplus.

France and Germany have created temporary terrorism reinsurance pools. Those programs share some attributes with each other but also have unique characteristics.[5] For example, in France, all property owners must purchase coverage, and all insurers must join the pool. In Germany, by contrast, coverage is not compulsory. However, both nations set premiums on the basis of the amount of coverage purchased, so rates do not vary with location. Insurers bear the initial losses, and the middle layers of losses are covered by private reinsurance. The government bears the risk of catastrophic losses, although Germany caps the losses that the government will cover (France does not). In return, the government shares in the premiums.[6]

4. Ignacio Machetti, "The Spanish Experience in the Management of Extraordinary Risks, Including Terrorism" (presentation to the Organization for Economic Cooperation and Development Conference on Catastrophic Risks and Insurance, Paris, November 22-23, 2004), available at www.oecd.org/dataoecd/59/24/33917485.pdf; and "Preparing for the Worst," *Reactions* (May 2004).

5. Howard Kunreuther, Erwann Michel-Kerjan, and Beverly Porter, *Assessing, Managing and Financing Extreme Events: Dealing with Terrorism,* Working Paper No. 10179 (Cambridge, Mass.: National Bureau of Economic Research, December 2003), pp. 27-28, available at http://papers.nber.org/papers/w10179.

6. Erwann Michel-Kerjan and Burkhard Pedell, *Terrorism Risk Coverage in the Post-9/11 Era: A Comparison of New Public-Private Partnerships in France, Germany, and the U.S.,* Working Paper No. 2004-029 (Philadelphia: University of Pennsylvania, Wharton Risk Management and Decision Process Center, October 2004), available at http://grace.wharton.upenn.edu/risk/downloads/GP.TerrorismPaperWharton.Oct.2004.pdf.

APPENDIX

B

Catastrophe Bonds for Natural Disaster and Terrorism Risks

The ways in which insurers deal with the risk of natural disasters offers various pointers for managing the risk of terrorist attacks. For example, different kinds of catastrophe bonds have proved useful in helping insurers transfer the financial risk from natural disasters, and such bonds are beginning to play a role in spreading terrorism risk as well.

Standard Catastrophe Bonds

Companies—typically reinsurers—issue catastrophe bonds as a way to raise funds, with the understanding that if a specified catastrophe occurs, they will be partly or fully forgiven from making interest and principal payments on the bonds. Thus, after a covered event, the reinsurer can use the money that would have otherwise been paid to bondholders to instead pay catastrophe claims.[1] Investors who purchase catastrophe bonds are compensated for the risk of not being fully repaid by receiving a relatively high interest rate before the disaster strikes.

Because catastrophe bonds are collateralized—usually by Treasury securities—against the issuers' default, primary insurers face no counterparty risk. (In contrast, insurers are at risk if reinsurers default on their obligations.) Most catastrophe bonds are for risks with less than a 1 percent likelihood of loss.

Prices for catastrophe bonds have been falling and volumes rising as investors gain more confidence in loss projections for natural disasters. Between 1997 and 2003, 54 catastrophe bonds were issued, with total risk limits of almost $8 billion. In 2003 alone, $1.73 billion in catastrophe bonds were issued globally, a 42 percent increase from the volume in 2002.[2] Purchasing such bonds is a way for investors to reduce portfolio risk because their returns are not correlated with market returns. That is, natural disasters—unlike major terrorist attacks—generally do not cause stock and bond markets to fall. Catastrophe bond funds have also emerged; however, the large majority of bonds have been rated below investment grade by credit-rating agencies because of the risk of suspended interest and principal payments.[3]

Multiple-Event-Risk Bonds

Some analysts believe that a way to expand the risk-securitization market may be to issue bonds that are less likely to experience losses, such as catastrophe bonds that cover the risk of multiple events.[4] Such bonds would generally require two separate disasters to occur before investors lost principal. (The bonds could be structured so that interest payments were suspended after the first disaster.) For example, a multiple-event bond might combine the risk of an earthquake in Tokyo with the risk of a hurricane in Florida.

That multiple-event structure offers some advantages. First, the likelihood that two disasters will occur is lower than the likelihood that one will occur, so adding a sec-

1. See Dwight M. Jaffee and Thomas Russell, "Catastrophe Insurance, Capital Markets, and Uninsurable Risks," *Journal of Applied Corporate Finance*, vol. 10, no. 3 (Fall 1997), pp. 84-95.

2. Christopher McGhee, *Market Update: The Catastrophe Bond Market at Year-End 2003* (Guy Carpenter and Company and MMC Securities Corporation, April 2004), available at www.guycarp.com/portal/extranet/pdf/Catbond2004b.pdf?vid=2.

3. Ibid., p. 6.

4. Gordon Woo, "A Catastrophe Bond Niche: Multiple Event Risk" (paper presented at the National Bureau of Economic Research Insurance Workshop, Cambridge, Mass., February 6-7, 2004), available at www.nber.org/~confer/2004/insw04/woo.pdf.

ond triggering event may reduce concerns about the reliability of the estimates for the separate events. Second, such a structure would help a bond secure an investment-grade rating, which would increase the number of institutional investors who could purchase it compared with a non-investment-grade (or "junk") bond. Moreover, if one of the triggering disasters took place, there would be time for the bond to be traded or put on a watch list by a credit agency. Third, a sequence of two or more catastrophes in a short period could damage an insurance company's credit rating or expose the company to the risk of insolvency, so protection against such a contingency would be a valuable tool to help insurers manage risk.

The organizers of the next World Cup soccer tournament, scheduled to be played in Germany in 2006, were able to issue a bond that protects against the risk that the event will be cancelled for any of a variety of reasons and against the risk of losing $260 million in sponsorship revenue.[5] (The event had previously been covered by a global reinsurer, but the reinsurer cancelled its coverage after September 11, 2001.) That bond deal is essentially a second-event transaction—meaning that the debt forgiveness kicks in only with the second event—since the World Cup can be relocated elsewhere or postponed for a year, if necessary. Modelers' best estimate of the risk of cancellation because of terrorism is 0.05 percent, or 5 basis points, but the range of possibilities yields results as much as seven to eight times higher than that (37 basis points). The spread between those estimates is more than twice the usual spread of estimated risks for natural disasters, reflecting the greater uncertainty of terrorism risk.[6]

5. That bond excludes certain risks: world war, radioactive contamination (unless caused by terrorism), a players' strike, and the bankruptcy of the World Cup sponsors. Wyn Jenkins, "FIFA's Golden Goal," *Reactions* (November 2003), pp. 44-47.

6. Moody's gave the bond an investment-grade rating of A3, but Standard & Poor's declined to rate it. Woo, "A Catastrophe Bond Niche," pp. 4-6.

Catastrophic-Mortality-Risk Bonds

An international insurance company with heavy exposure in the United States, Swiss Re, has securitized the risk of catastrophic mortality, measured with respect to a mortality risk index. That practice is significant because workers' compensation policies expose insurers to the catastrophic risk that large numbers of employees may be killed or injured from a terrorist attack.

In Swiss Re's security, payouts would be triggered by any series of events—or less likely, a single event—that resulted in 30 percent more deaths than the expected mortality risk (or as many as 750,000 additional deaths) through the end of 2006. Such events could include terrorist attacks with weapons of mass destruction, contaminations, or outbreaks of disease such as severe acute respiratory syndrome (SARS), influenza, or other respiratory illnesses. Bundling together those remote risks mitigates the ambiguity that surrounds the risk of a single event.[7] In other words, investors might lack confidence in the estimates of expected losses from a single event but have more confidence in the joint probability of two remote events' occurring.[8]

Securitizing Terrorism Risk

The issuance of multiple-event disaster bonds and the securitization of mortality risk suggest that workers' compensation risk and terrorism risk could be securitized. For example, a workers' compensation bond might cover an earthquake in Los Angeles and a terrorist attack, but it would cause a loss of principal only if both events occurred.[9]

7. The security received investment-grade ratings from both Standard & Poor's and Moody's. Ibid., pp. 6-8.

8. However, some analysts believe that bundling separate risks into one bond might limit demand for the bonds on the part of investors unless the market could separate the two disaster risks. Personal communication to the Congressional Budget Office by Jeffrey R. Brown, University of Illinois at Urbana-Champaign, November 3, 2004.

9. Ibid., p. 11.

APPENDIX

C

Federal Disaster Assistance After the September 11 Attacks

Federal disaster assistance to individuals, businesses, and state and local governments following the terrorist attacks of September 11, 2001, totaled $25 billion to $33 billion or more, depending on which outlays are assumed to be contingent on the attacks. By any measure, however, that federal aid exceeds what has been spent after large natural disasters. Just over $20 billion of the aid was targeted to the New York City area—$15.7 billion in direct spending and $5 billion in tax benefits.[1] Another $7 billion was paid to victims or their relatives from the September 11th Victim Compensation Fund, and $5 billion went to U.S. airlines.

Overall Assistance

According to the Government Accountability Office (formerly the General Accounting Office), federal assistance to New York broke down as follows:

- About $2.6 billion was spent on the initial response efforts, including search-and-rescue operations, debris removal, emergency transportation, and temporary repairs to utilities.
- Roughly $4.8 billion was spent for disaster-related costs and losses, including funds provided to New York City and New York State for rebuilding of facilities, to individuals for housing assistance, and to businesses for lost revenues.
- Almost $5.6 billion was committed to restore New York's public transportation system and utility infrastructure in lower Manhattan. The attacks destroyed a commuter train terminal underneath the World Trade Center and several surrounding subway stations. Repairing and resurfacing of roads damaged by the blast and falling debris were also financed.
- $5.5 billion was authorized for the revitalization of lower Manhattan's economy, including $5 billion in tax benefits and $500 million in incentives to retain existing businesses and attract new ones.[2]

1. See the letter from Dan. L. Crippen, Director, Congressional Budget Office, to the Honorable Carolyn B. Maloney, U.S. House of Representatives, October 29, 2002. CBO estimates that three emergency supplemental appropriation acts dealing with recovery from and response to terrorist attacks on the United States provided $15.7 billion in assistance to the city of New York. In addition, CBO and the Joint Committee on Taxation estimate that Public Law 107-147 provided businesses and individuals in New York City with about $5 billion in tax relief over the 2002-2012 period. Also see General Accounting Office, *September 11: Overview of Federal Disaster Assistance to the New York City Area*, GAO-04-72 (October 2003). The first emergency supplemental appropriation act in 2001 provided that at least half of the $40 billion available be used for disaster recovery and assistance related to the September 11 attacks. See M. Ann Wolfe, *Homeland Security: 9/11 Victim Relief Funds*, CRS Report for Congress RL31716 (Congressional Research Service, updated August 24, 2004). Other sources suggest that assistance may exceed $20 billion. RAND estimates that government compensation to victims and businesses from the attacks totaled $15.8 billion. That estimate excludes assistance to state and local governments for infrastructure and building repairs and site cleanup; however, it includes a relatively small amount of spending by those governments. See Lloyd Dixon and Rachel Kagonoff Stern, *Compensation for Losses from the 9/11 Attacks* (Santa Monica, Calif.: RAND Institute for Civil Justice, November 2004), available at www.rand.org/publications/MG/MG264/. In general, the estimates do not include the value of all of the tax benefits to individuals receiving compensation for September 11 losses.

2. See General Accounting Office, *September 11: Overview of Federal Disaster Assistance to the New York City Area*. Plans for spending the remaining funds were not finalized as of June 30, 2003, but those funds were likely to go to infrastructure restoration or economic revitalization.

Much of the disaster response and relief was coordinated by the Federal Emergency Management Agency (FEMA) in accordance with the Robert T. Stafford Disaster Relief and Emergency Assistance Act. In total, about $8.8 billion of the funding outlined above was appropriated to FEMA for the New York City area, of which $7.4 billion went for debris removal and infrastructure restoration, with the rest going to individuals and other nonpublic assistance.

In addition, the Air Transportation Safety and System Stabilization Act provided $5 billion in grants to U.S. passenger and cargo airlines as compensation for losses sustained as a direct result of the terrorist attacks.[3] That law also created the September 11th Victim Compensation Fund to provide monetary compensation for the economic and noneconomic losses (including pain, suffering, and loss of companionship) of people injured or killed in the attacks. The total payout from the fund was $7 billion, divided among 2,880 people who received death-benefit payments, and 2,677 who received disability payments.

Assistance to Businesses

The pattern of federal disaster aid to companies after the September 11 attacks suggests that the Congress might provide additional assistance to uninsured firms following another terrorist attack. Most of the post-September 11 assistance directed at firms was targeted toward the economic recovery of lower Manhattan. According to RAND Corporation, government assistance to businesses in New York City totaled $6.2 billion in subsidized loans, grants, and tax benefits.[4] New York businesses also received roughly three times that amount from insurance companies, for total benefits of $23.3 billion.

The federal government assisted small businesses that had not purchased insurance, but studies suggest that such aid covered only a modest portion of their uninsured losses.[5] Between two-thirds and three-quarters of retail businesses in lower Manhattan had insurance that covered losses from the attacks, but small businesses generally did not carry enough business-interruption coverage (which replaces business income lost because of physical disruptions). Federal aid to small businesses included about $90 million in subsidized property-damage loans and Economic Injury Disaster Loans from the Small Business Administration.[6] Small firms also received $578 million in business-recovery grants from the Department of Housing and Urban Development to cover uninsured losses, such as damage to equipment, cleanup costs, and three days' to 25 days' worth of lost revenue. That grant program replaced only about 17 percent of the recipients' revenue losses.

The federal government also made $160 million in grants available to provide incentives to attract and retain small firms in lower Manhattan. Investor-owned utility companies received $750 million for damage to communications and energy infrastructure, which is typically not covered under the Stafford Act. And a World Trade Center job-creation and retention program paid $214 million to firms that committed to maintaining jobs in lower Manhattan.

In addition, title III of the Job Creation and Worker Assistance Act of 2002 provides tax relief to businesses and individuals in New York City worth about $5 billion over 10 years, the Congressional Budget Office and the Joint Committee on Taxation estimate. That federal tax relief includes the Liberty Zone tax-benefit program for businesses operating in Manhattan south of Canal Street—the first time the Congress has passed a geographically targeted package of tax benefits after a disaster. The benefits include accelerated depreciation for assets located in the zone (worth $2.6 billion over 10 years), tax credits based on the number of employees in a firm ($630 million), and expanded authority to issue tax-exempt private-activity bonds to finance construction in the zone ($1.2 billion).[7]

3. See Congressional Budget Office, *Pay-As-You-Go Estimate for H.R. 2926, Air Transportation Safety and System Stabilization Act* (November 30, 2001). In addition, that law authorized the federal government to guarantee $10 billion in loans for the airlines.

4. Dixon and Stern, *Compensation for Losses from the 9/11 Attacks*, Table 7.5, p. 125.

5. Ibid., p. xxix. Also see General Accounting Office, *September 11: Small Business Assistance Provided in Lower Manhattan in Response to the Terrorist Attacks*, GAO-03-88 (November 2002).

6. The $90 million estimate comes from Dixon and Stern, *Compensation for Losses from the 9/11 Attacks*, p. 109. CBO has a higher estimate: $150 million for Small Business Administration (SBA) business loans for Manhattan provided in the 2002 defense appropriation act. In addition, the first 2001 emergency supplemental appropriation act provided $100 million in SBA disaster loans that went largely to individuals. Letter from Dan. L. Crippen to Carolyn B. Maloney, October 29, 2002.

7. Those estimates come from the Joint Committee on Taxation, cited in Dixon and Stern, *Compensation for Losses from the 9/11 Attacks*, p. 117. Adding in forgone tax revenues from provisions that allow advance refunding of municipal bonds brings the total cost of the Liberty Zone tax benefits to $5 billion.