The Future of Terrorism Risk Insurance in the US: Looking Beyond TRIA

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Key Questions Addressed by Wharton Risk Center study on *TRIA and Beyond*

How does terrorism insurance fit into homeland security policy?

How does one determine insurability of a risk?

What is an appropriate framework for determining supply and demand for terrorism protection?

What are impediments to free market for terrorism risk management?

Does Terrorism Risk Insurance Act (TRIA) address these problems?

Who bears the loss from terrorism attack under TRIA?

What are alternative long-term options for terrorism insurance and what future research needs to be addressed?
Nature of Terrorism Insurance
Pre and Post 9/11

Prior to September 11, 2001
Terrorism coverage in the United States was included in standard commercial insurance policy packages as an unnamed peril

Terrorist attacks of September 11, 2001
The most costly event in the history of insurance
Insured damage currently estimated at $35 billion covered by 150 insurers and reinsurers worldwide
Reinsurers responsible for 2/3 of the $35 billion in claims
Most reinsurers stopped providing coverage in U.S. or raised premiums drastically

By 2002
45 states in the U.S. permitted insurance companies to exclude terrorism from their policies (except WC)
Terrorism Risk Insurance Act (TRIA) passed by Congress in Nov. 2002
Strategies and Policies to Deal with Terrorism Risk

Federal Government Policies

FOREIGN POLICY

COUNTER TERRORISM POLICY

ECONOMIC STIMULATION AND VICTIM COMPENSATION

Private Sector Policies

Mitigate Risk

Transfer losses to counterparty

Absorb losses through firm’s own capital

Securitize

Insure

Transfer to lenders, etc.

TRIA
Nature of Insurability of Risks

Conditions for Providing Coverage
• Ability to identify and quantify risk
• Use of past data and scientific estimates

Role of Catastrophe Models
• Coordinates data on probability and outcomes
• Enables one to construct exceedance probability curves

Importance of Survival Constraint
• Probability \[ \text{Claims Payments (L*)} > (\text{Premiums + Assets}) \] < \( p_1 \)
• Determines number of policies firm is willing to write
Sample Mean Exceedance Probability Curve
Loss exceedance probability curves

Probability $p(L)$ that losses will exceed $L$

Loss, $L$ (in dollars)

Uncertainty in Probability

Uncertainty in Loss

95%

Mean

5%

Loss exceedance probability curves
Determining Ex Ante Demand by Commercial Firms

P (price)

Q (coverage)

D'

D''

D

P

P'

P''

Q
Determining Ex Ante Supply by Insurers

$P$ (price)

$Q$ (coverage)

$L_{max}$

$L''_{max}$

$L'_{max}$

$S''$

$S'$

$S''$

$L'_{max}$
Determining Ex Ante Price and Quantity of Insurance
Is Terrorism Risk Insurable by the Private Sector Alone?

Challenges presented by terrorism risk today

- Highly ambiguous risk
- Potential for extremely large losses
- Dynamic uncertainty
- Interdependency of risk
- Role of the government (national security, foreign policy)

State regulations requiring terrorism coverage with or without TRIA

- Workers compensation
- Standard fire policy covers claims from terrorist attack

Insurers concern with their credit ratings (e.g. AM Best, Moody’s, S&P)

Limited capacity to cover large losses

- Limited reinsurance
- Reluctance of capital markets to provide protection

Federal tax policy significantly increases the costs to insurers and reinsurers of holding the large amounts of capital (surplus) necessary to insure terrorism
Special Features of TRIA

All insurers required to offer coverage to their commercial policyholders

Policyholders have freedom to accept coverage

Free upfront government reinsurance, but government can partially recoup its payment ex post against all policyholders

Specific risk-sharing arrangement between government and insurers for a certified event (i.e. losses from terrorism greater than $5 million)

TRIA covered “certified events” only (no domestic terrorism)
Loss Sharing under TRIA Between An Insurer and Federal Government

Federal payment: 90% above deductible

- Insurer’s Deductible ($D_i$)
- Insurer’s Loss ($L$)
- Federal payment
- Insurer’s payment

Federal payment: 90% above deductible

Insurer’s payment

$L_1$  

$L_2$  

Insurer’s Loss ($L$)
Loss Sharing under TRIA between Insurance Industry, All Policyholders and Taxpayers (2005)

Total Insured Loss

\[ \sum_{i} \left( \text{Min}(L_i; ID_i) + 10\% \cdot (L_i - ID_i)^+ \right) \]

Total initial federal payment:
\[ \sum_{i} 90\% \cdot (L_i - ID_i)^+ \]

Taxpayers
Policyholders
Insurers

Industry retention ($15bn)

All policyholders

Total insurance payments
Market Reaction to a Terrorist Attack, with and without TRIA

Diagram showing supply and demand curves with and without TRIA.
How do insurers determine their terrorism exposure?

Utilize deterministic scenarios
(e.g. 5-6 ton truck bomb explosion)

Consider aggregate exposure (E) under from a given scenario and relate to surplus (S)

Coverage is determined by computing maximum acceptable E/S ratio (e.g. E/S =10%)

This E/S ratio is a proxy for their survival constraint
The Deductible/Surplus ratio (D/S) is a proxy for E/S
Change in D/S Ratio for the Top 451 Insurers under TRIA (2003-2005)
## Loss Allocation Process

<table>
<thead>
<tr>
<th>Loss Sharing Criteria</th>
<th>Insured Loss by Insurers</th>
<th>Deductible of each Insurer</th>
<th>Potential 10% above</th>
<th>Fed payment 90% above deductible</th>
<th>Total payment by Insurer</th>
</tr>
</thead>
<tbody>
<tr>
<td>L1</td>
<td>D1</td>
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<tr>
<td>L2</td>
<td>D2</td>
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<tr>
<td>L3</td>
<td>D</td>
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<td>Ln</td>
<td>Dn</td>
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</table>

- **Direct Losses potentially Covered by Insurance**
- **Covered Losses**
- **Interdependent losses not covered by insurance**
- **Some victims did not purchase Terrorism insurance**
- **Insurers 1, 2, 3, ..., n covering victims pay for insured losses; possible loss-sharing with federal government**

### Questions
- What target?
- Where?
- What mode of attack?
- Limitations of insurance coverage
- What part of your loss is effectively covered by insurance contract?
- What is the Insurance penetration?
- What is included without terrorism insurance (e.g., WC, fire following)
- Who pays what?
- Public-private loss sharing
Property Losses and Workers’ Compensation Losses from 5-Ton Bomb Attacks to 447 High Rise Buildings in the United States
Will Insurers Strategize if TRIA is Made Permanent?

Insurers pay for all losses they incur below this deductible ($D$) and 10% of the loss above $D$, the remaining 90% eventually paid by other parties (taxpayers, policyholders)

Collect all premiums

Economic incentive for any insurer with a low deductible/surplus ($D/S$) ratio to write a large number of policies in a concentrated area

Application with 10% of insurers’ surplus at risk of terrorism
Insurer’s Exposure Limited to 10% of Its Surplus

\[ E = E^* = 10\% \]

\[ E = D + 0.1(E^*-D) = 10\% \]

\( D/S < 10\% \)

\( D/S > 10\% \)
Aggregate Exposure - Additional Capacity Provided by Insurers with D/S < 10%

Aggregate exposure $E^*$

Insurer (a)

Insurer (b)

Additional capacity; Potential loss the insurer will not bear

$E^* = E = 10\% \cdot S$

D/S > 10%

D/S < 10%
## Distribution of Losses under TRIA Today and if TRIA is Made Permanent
($25 billion Loss in New York City)

<table>
<thead>
<tr>
<th>SCENARIOS</th>
<th>Non-insured</th>
<th>Total insured</th>
<th>Insurers’ Payments</th>
<th>All Policyholders</th>
<th>Final Fed. Gov Taxpayers</th>
</tr>
</thead>
<tbody>
<tr>
<td>TRIA Today – 50% take-up rate on Property Insurance – Top 23 insurers</td>
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</tr>
<tr>
<td>Total: $25bn Property: $15bn; WC: $10bn</td>
<td>$7.5bn</td>
<td>$17.5bn</td>
<td>$13.3bn</td>
<td>$1.7bn</td>
<td>$2.5bn</td>
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<tr>
<td>Insured loss sharing</td>
<td>76%</td>
<td>9.8%</td>
<td>14.2%</td>
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<tr>
<td>TRIA Extended Indefinitely – 100% take-up rate – Top 23 insurers</td>
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</tr>
<tr>
<td>Total: $25bn Property: $15bn; WC: $10bn</td>
<td>$0</td>
<td>$25bn</td>
<td>$8.4bn</td>
<td>$6.6bn</td>
<td>$10bn</td>
</tr>
<tr>
<td>Insured loss sharing</td>
<td>46%</td>
<td>14%</td>
<td>40%</td>
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<tr>
<td>Δ in final payments</td>
<td>-37%</td>
<td>+288%</td>
<td>+400%</td>
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<tr>
<td>TRIA Today – 50% take-up rate (TRIA-line premium market) – Top 23 insurers</td>
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</tr>
<tr>
<td>Total: $100bn Property: $50bn; WC: $50bn</td>
<td>$25bn</td>
<td>$75bn</td>
<td>$24bn</td>
<td>$0</td>
<td>51bn</td>
</tr>
<tr>
<td>Insured loss sharing</td>
<td>32%</td>
<td>0%</td>
<td>68%</td>
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<tr>
<td>TRIA Extended Indefinitely – 100% take-up rate – Top 23 insurers</td>
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</tr>
<tr>
<td>Total: $100bn Property: $50bn; WC: $50bn</td>
<td>$0</td>
<td>$100bn</td>
<td>$20.7bn</td>
<td>$0</td>
<td>$79.3bn</td>
</tr>
<tr>
<td>Insured loss sharing</td>
<td>20.7%</td>
<td>0%</td>
<td>79.3%</td>
<td></td>
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</tr>
<tr>
<td>Δ in final payments</td>
<td>-14%</td>
<td>0%</td>
<td>+55%</td>
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</tr>
</tbody>
</table>
Long-term Options for Terrorism Insurance

• Deploy Capital of Potential Target Firms
• Reduce Insurers’/Reinsurers’ Tax Costs of Holding Capital
• Deploy Capital of Reinsurers
• Facilitate the Use of Terrorism Catastrophe Bonds
• Mutual Insurance Pools
• Publicly Administered Mutual Insurance
• Federal Reinsurance with Explicit Premiums
Issues for Future Research

• Gaining Knowledge of Terrorism Premiums Collected

• Possible Federal Pre-Emption of Certain State Regulations and Requirements

• Considering Covering Both Domestic and Foreign Terrorism
Summary and Conclusions

Terrorism is a highly uncertain risk and hence presents insurability problems.

Under current TRIA structure insurers cover most losses from terrorist attacks due to high deductible (currently 15%).

Little indication that reinsurers and capital markets have appetite for covering catastrophic losses from a terrorist attack.

Federal government may be needed to deal with catastrophic losses.

TRIA in its current form is not an efficient and equitable solution to the terrorism problem.

There is a need for a longer-term study to examine role of public and private sectors in dealing with terrorism and other extreme events (e.g. natural disasters, catastrophic losses).

Call for a national commission to be established by Congress / White House.