

Terrorism & Enterprise Risk Management

Scenarios & Uncertainty

**Enterprise Risk Management Symposium
Chicago, IL**



April 15, 2008

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Presentation Outline

- **Terrorism Risk**
 - **What do we know 6 ½ after 9/11?**
 - **Implications for risk managers and ERM**
- **Terrorism Scenarios**
 - **Limited utility of traditional tools of risk management**
- **ERM & The Holistic Approach to Managing Terrorism Risk**
- **The Market for Terrorism Insurance**

WHAT DO WE KNOW?

*6 1/2 YEARS AFTER 9/11,
IS TERRORISM AN
INSURABLE RISK?*





Our Knowledge About Terrorism is Still Remedial; Insurance Markets Limited

- **Absence of terrorist attacks on American soil since 2001 has helped to restore stability and confidence in the US economy and commercial insurance markets**
- **Ironically, the absence of attacks means that what we have learned since 2001 is mostly academic, circumstantial or indirect—garnered from the experience of other countries (e.g., U.K., Spain)**
 - **Some important experience has been gained in avoiding attacks**
 - **In contrast, we've learned much from the hurricanes of 2004/05**
- **Hundreds of billions of dollars have been spent on national security (effectively tools of risk management available exclusively to government), but this has no practical actuarial effect on the price or availability of terrorism-exposed lines of insurance**
- **Conclusion: Terrorism is nearly as uninsurable to day as it was in the wake of 9/11**
- **Stability in the market is due almost exclusively to 2 factors:**
 - (i) TRIA (ii) Absence of subsequent attacks since 2001



Implications for Risk Managers & Enterprise Risk Management

- Since 2001 risk managers have been left with three fundamentally difficult or impossible tasks regarding terrorism risk:
 - Identification
 - Quantification
 - Mitigation
- **Identification**: Thousands of vulnerabilities have been identified, but many (and perhaps most) have not
- **Quantification**: Models have been developed that help determine the dollar damage of property and casualty exposures, but how accurate are they (no doubt less so than catastrophe models)?
- **Mitigation**: Corporations and government have spent hundreds of billions to reduce perceived risks, but most are unproven.
- Enterprise Risk Management implies that a holistic approach to such risk be taken, but the practice of ERM in the terrorism context is hampered by huge knowledge gaps



Terrorism Violates Traditional Requirements for Insurability

Requirement	Definition	Violation
Estimable Frequency	<ul style="list-style-type: none">• Insurance requires large number of observations to develop predictive rate-making models (an actuarial concept known as credibility)	<ul style="list-style-type: none">• Very few data points• Terror modeling still in infancy, untested.• US intelligence infrastructure deeply flawed .
Estimable Severity	<ul style="list-style-type: none">• Maximum possible/ probable loss must be at least estimable in order to minimize “risk of ruin” (insurer cannot run an unreasonable risk of insolvency though assumption of the risk)	<ul style="list-style-type: none">• Potential loss is virtually unbounded.• Losses can easily exceed insurer capital resources for paying claims.• Extreme risk in workers compensation and statute forbids exclusions.

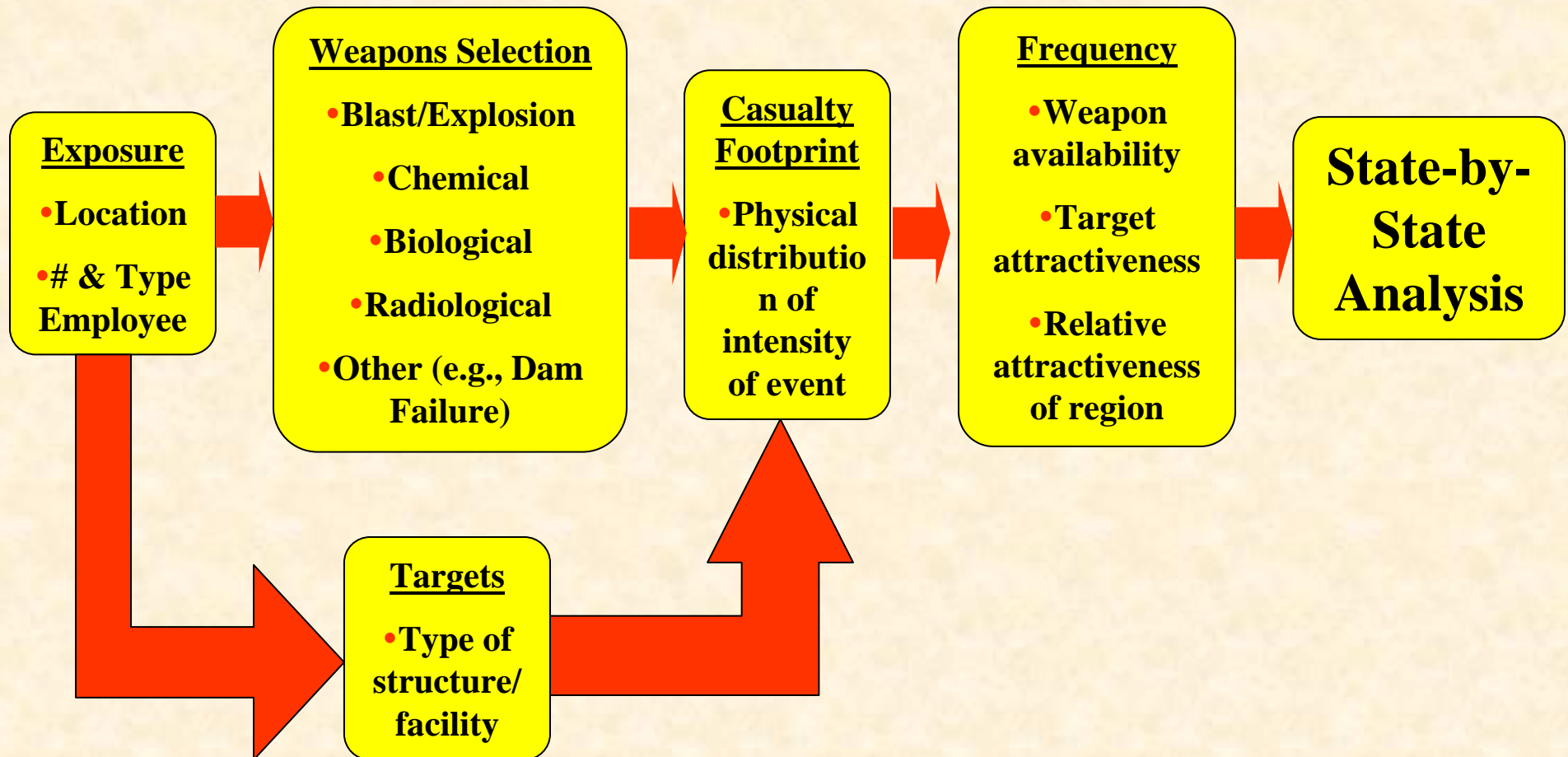


Terrorism Violates Traditional Requirements for Insurability (cont'd)

Requirement	Definition	Violation
Diversifiable Risk	<ul style="list-style-type: none"> • Must be able to spread/distribute risk across large number of risks • “Law of Large Numbers” helps make losses manageable and less volatile 	<ul style="list-style-type: none"> • Losses likely highly concentrated geographically or by industry (e.g., WTC, power plants) • Take-up rate low outside most at-risk zones/industries leads to <i>adverse selection</i> problem
Random Loss Distribution/Fortuity	<ul style="list-style-type: none"> • Probability of loss occurring must be purely random and fortuitous • Events are individually unpredictable in terms of time, location and magnitude 	<ul style="list-style-type: none"> • Terrorism attacks are planned, coordinated and deliberate acts of destruction • Dynamic target shifting from “hardened targets” to “soft targets” • Terrorist adjust tactics to circumvent new security measures • Actions of US and foreign governments may affect likelihood, nature and timing of attack



Terrorism Scenarios: Modeling Severity & Frequency



Sources: Insurance Information Institute based on NCCI Item Filing B-1383 & EQECAT modeling.



Additional Insurability Concerns

■ **Information Problems:**

➤ Traditional Insurance assumes that emerging issue information is available and shared (Terrorism information sharing is “asymmetric” – Classified data is not shared).

■ **Unique Role & Responsibility of Government:**

➤ Insurance is designed for policyholders’ insurable interests (Victims of terrorism are mostly surrogate targets for attacks mainly aimed at government, and the government is in a unique position to influence the likelihood of attack based upon foreign policy.)



Additional Insurability Concerns

■ **Surplus Impairment Risk:**

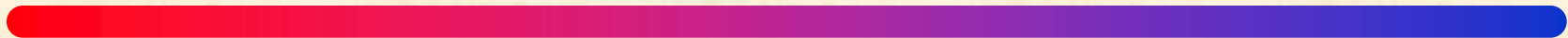
■ Statutory Accounting requires insurers to set aside reserves for the ultimate liabilities arising from the insurance policies they underwrite. (Insurers are *not allowed to post reserves for losses that have not occurred. Therefore, insurers are not allowed to post reserves specifically related to catastrophe losses* from natural perils or terrorism until they actually occur. *As a result, catastrophe losses deplete insurer's capital & surplus base intended for the security of all policyholders*).

➤ **Pre-Loss Funding:**

➤ Almost all insurance assumes that premiums are paid first, normally at the inception of the policy. (In terrorism programs or pools, private and public sector solutions, such as TRIA, often use a combination of pre-loss and post-loss funding.)

TERRORISM SCENARIOS

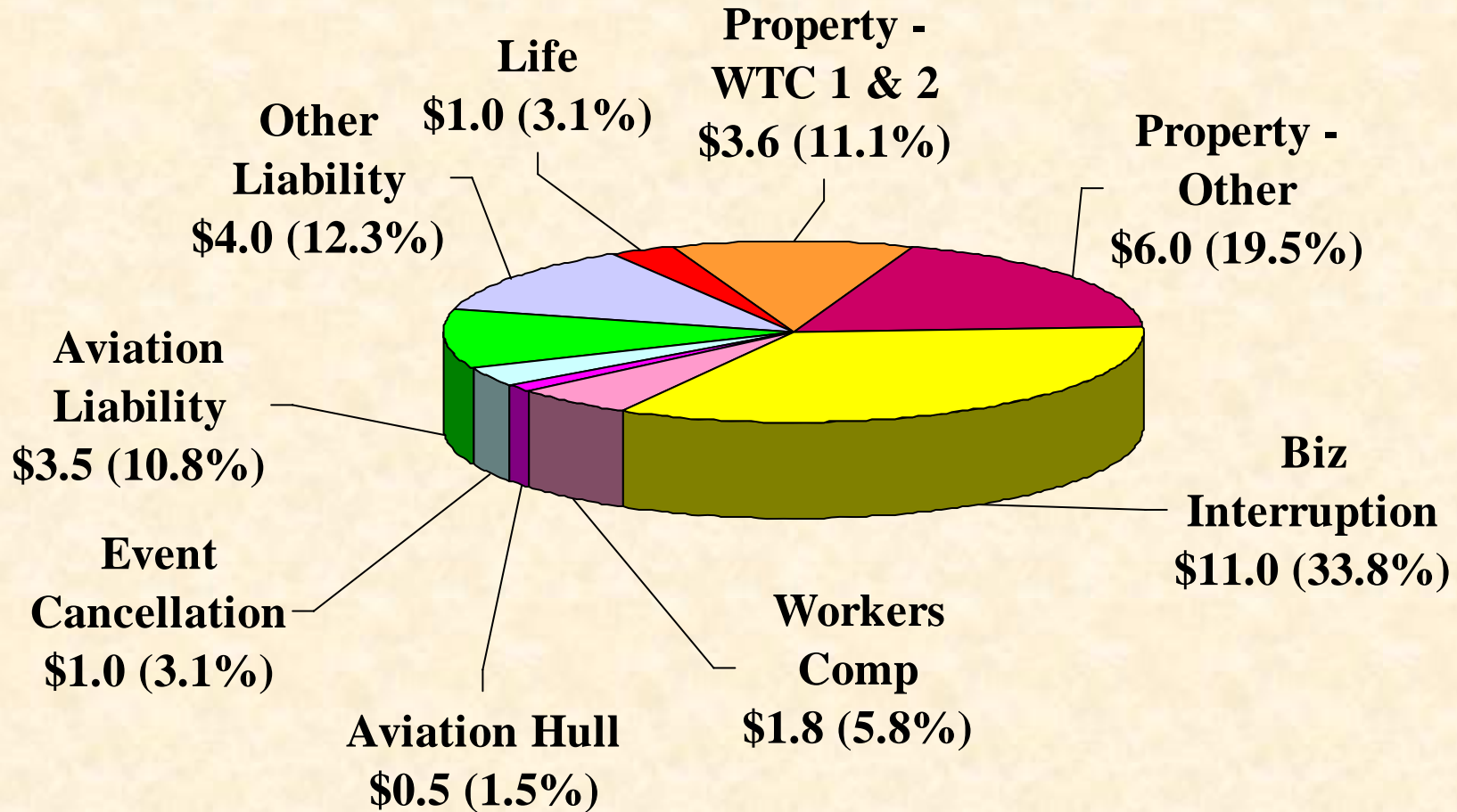
*Traditional Tools of Risk
Management Can Provide Only
Limited Benefits*





Sept. 11 Industry Loss Estimates

(\$ Billions)

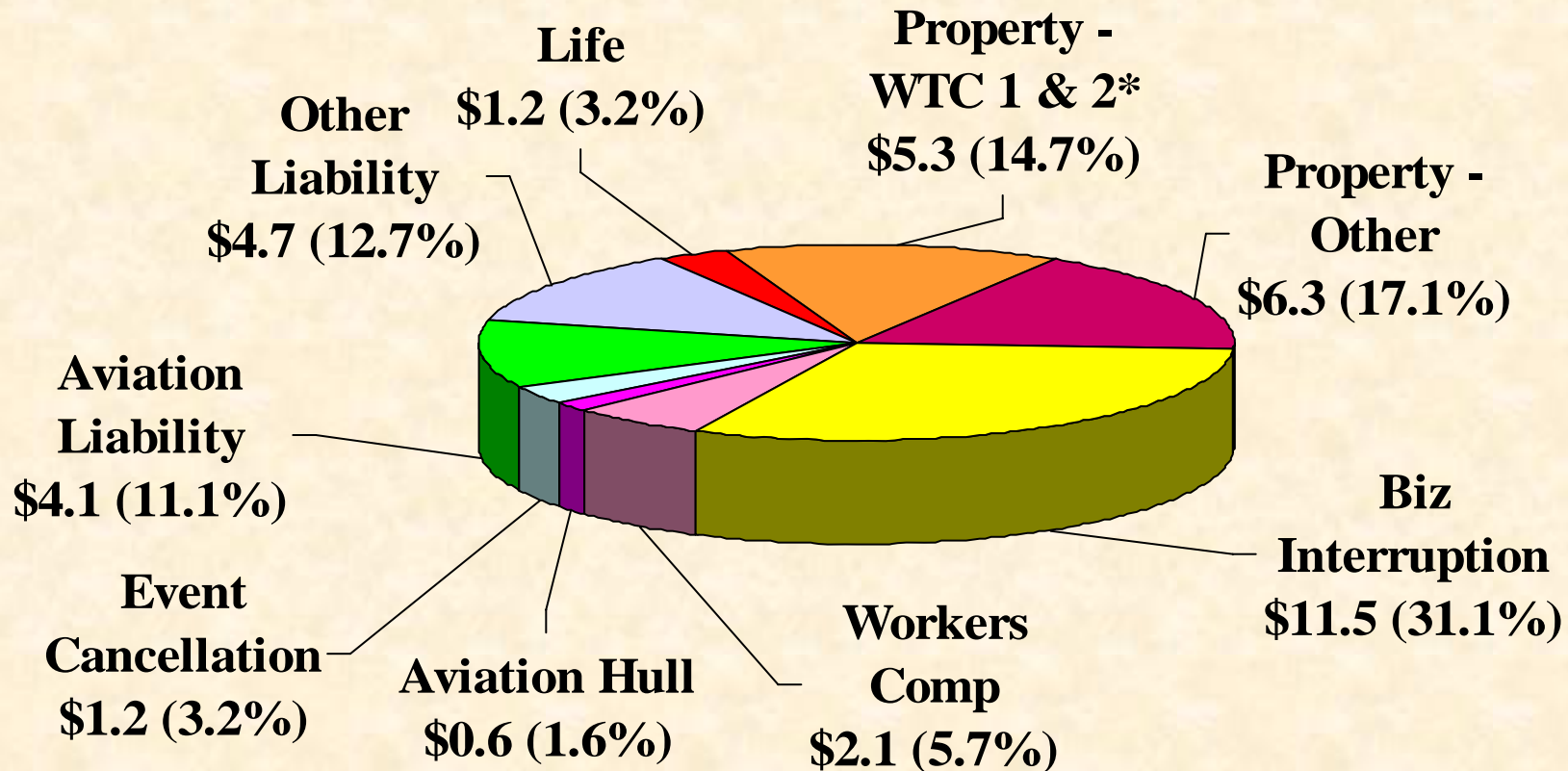


Current Insured Losses Estimate: \$32.5B

Source: Insurance Information Institute



Loss Distribution by Type of Insurance from September 11 Terrorist Attack (\$ Billions) (Stated in 2007 Dollars)



Total Insured Losses Estimate: \$36.9B

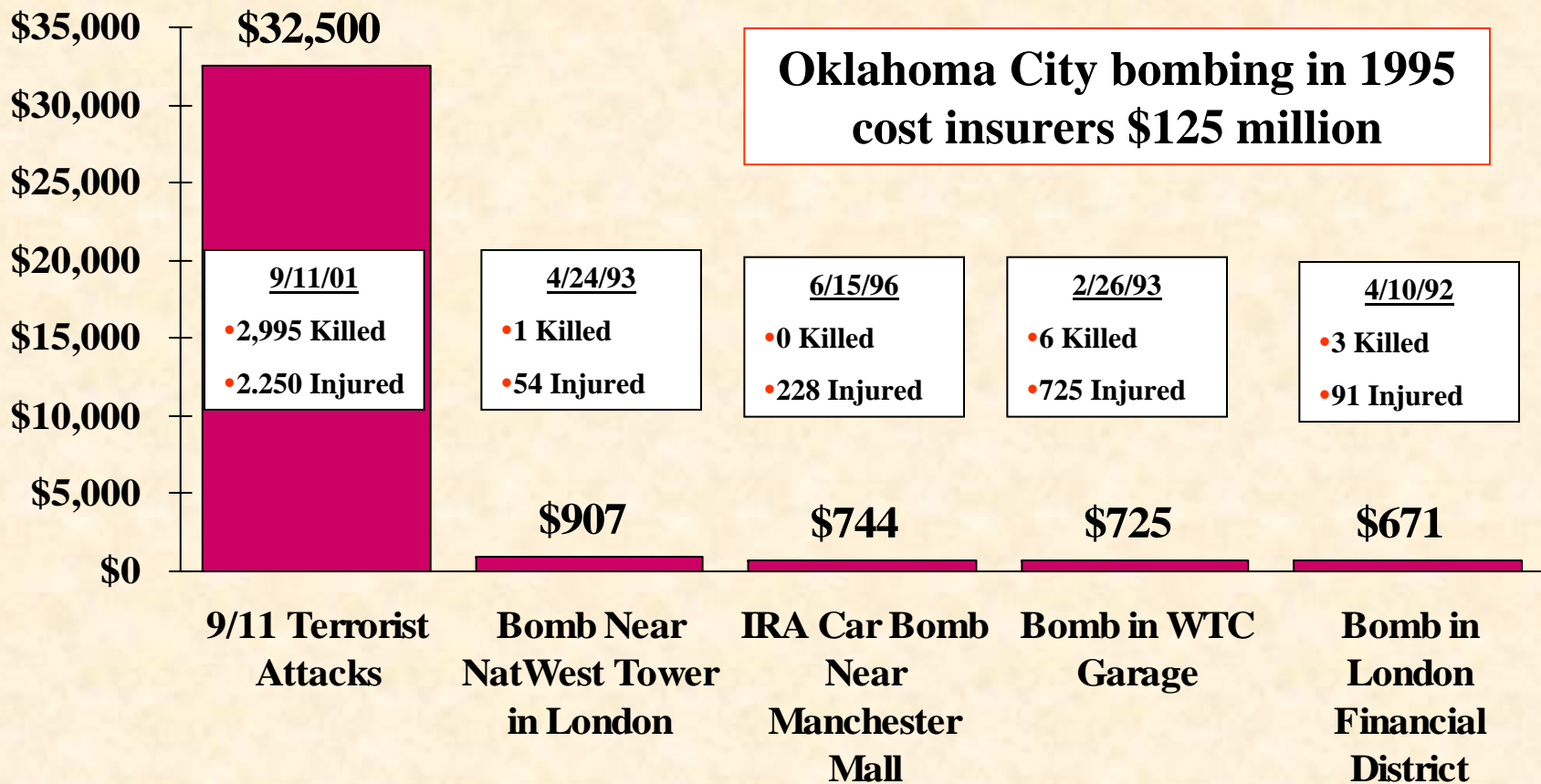
*Final settlement amount on claims on the WTC complex itself of \$4.55 billion as announced on May 23, 2007 by New York State and Port Authority of New York and New Jersey. Figure is adjusted to 2007 price level. Losses stated in 2001 dollars are \$32.5 billion.

Source: Insurance Information Institute



Top 5 Costliest Terrorist Attacks (by insured property loss*)

\$ Millions, Adjusted to 2001 Price Level



*Includes property, business interruption and aviation hull losses.
Source: Swiss Re; Insurance Information Institute.



Insured Loss Estimates: Large NBCR Attack (\$ Billions)

Type of Coverage	New York	Washington	San Francisco	Des Moines
Group Life	\$82.0	\$22.5	\$21.5	\$3.4
General Liability	14.4	2.9	3.2	0.4
Workers Comp	483.7	126.7	87.5	31.4
Residential Prop.	38.7	12.7	22.6	2.6
Commercial Prop.	158.3	31.5	35.5	4.1
Auto	1.0	0.6	0.8	0.4
Total	\$778.1	\$196.8	\$171.2	\$42.3



*Models of Property and WC losses (Insured and Uninsured)**

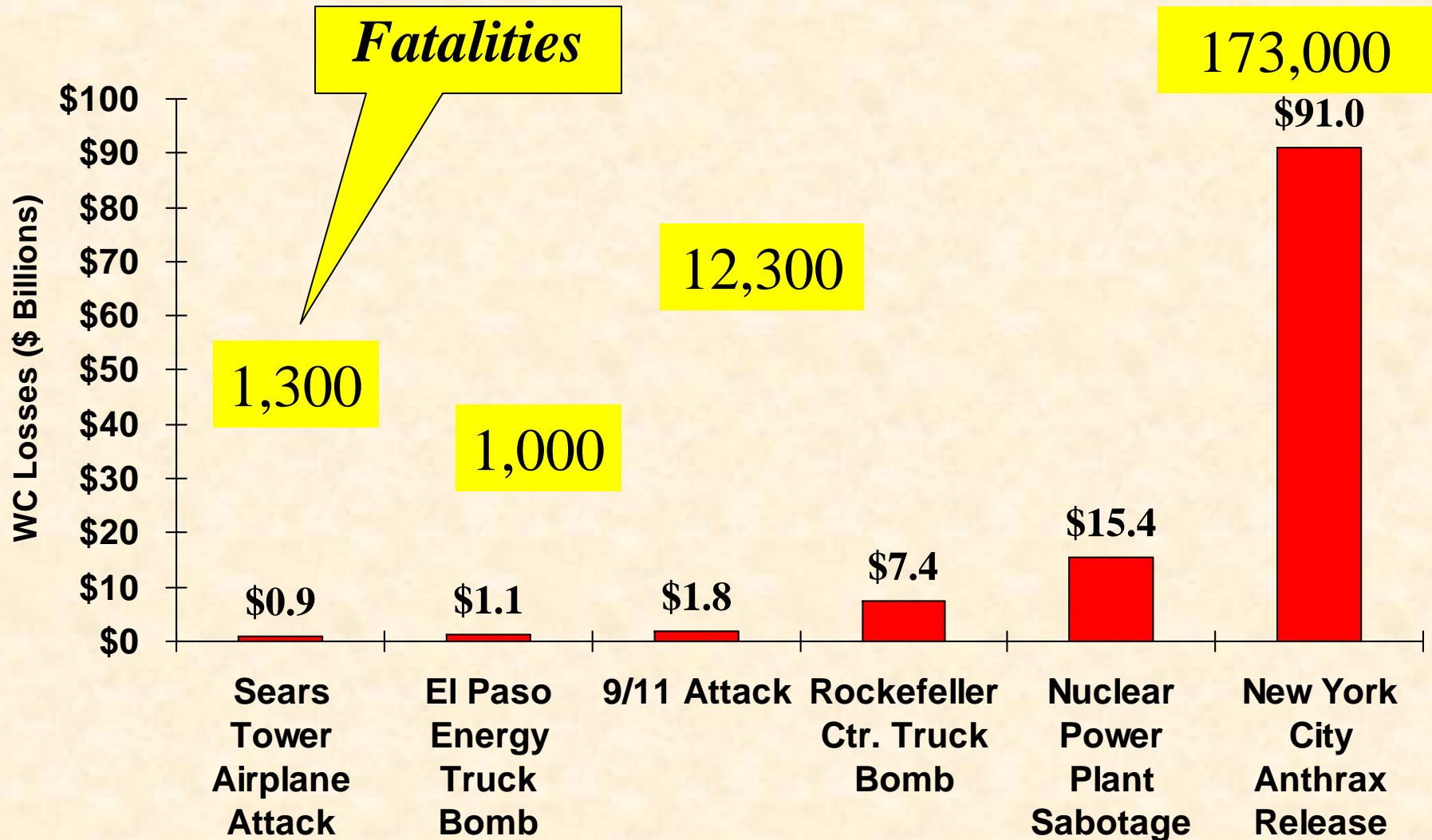
Attack Scenario	Losses (\$ billions)			
	WC	Property	Total	Simulated Range
Conventional				
10-Ton Truck Bomb	\$11	\$11	\$22	\$7-\$66
1-Ton Truck Bomb	2	5	7	2-21
NBCR				
5-kiloton Nuclear Bomb	320	310	630	210-1,900
Outdoor Anthrax	160	240	400	130-1,200
Radiological Attack	0.5	62	63	20-190
Indoor Sarin Attack	5	1	6	2-18

*Based on Risk Management Solutions (RMS) models.

Source: RAND, *Trade-Offs Among Alternative Government Interventions in the Market for Terrorism Insurance*



Estimated Workers Comp Insured Losses & Deaths for Terrorist Events



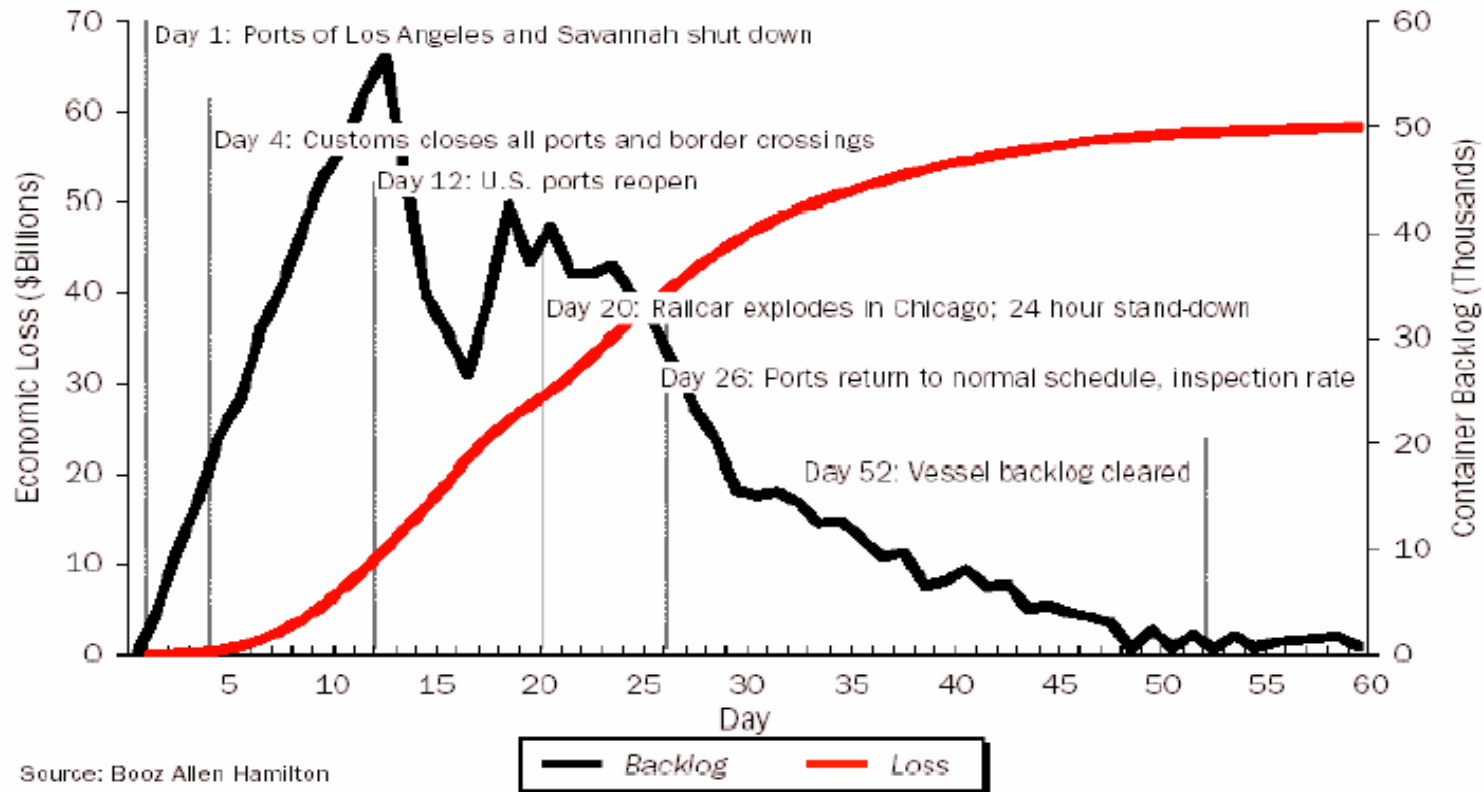
Source: Eqecat, NCCI.



Port Security War Game Estimates \$58B Impact from Simulated Terrorist Attack

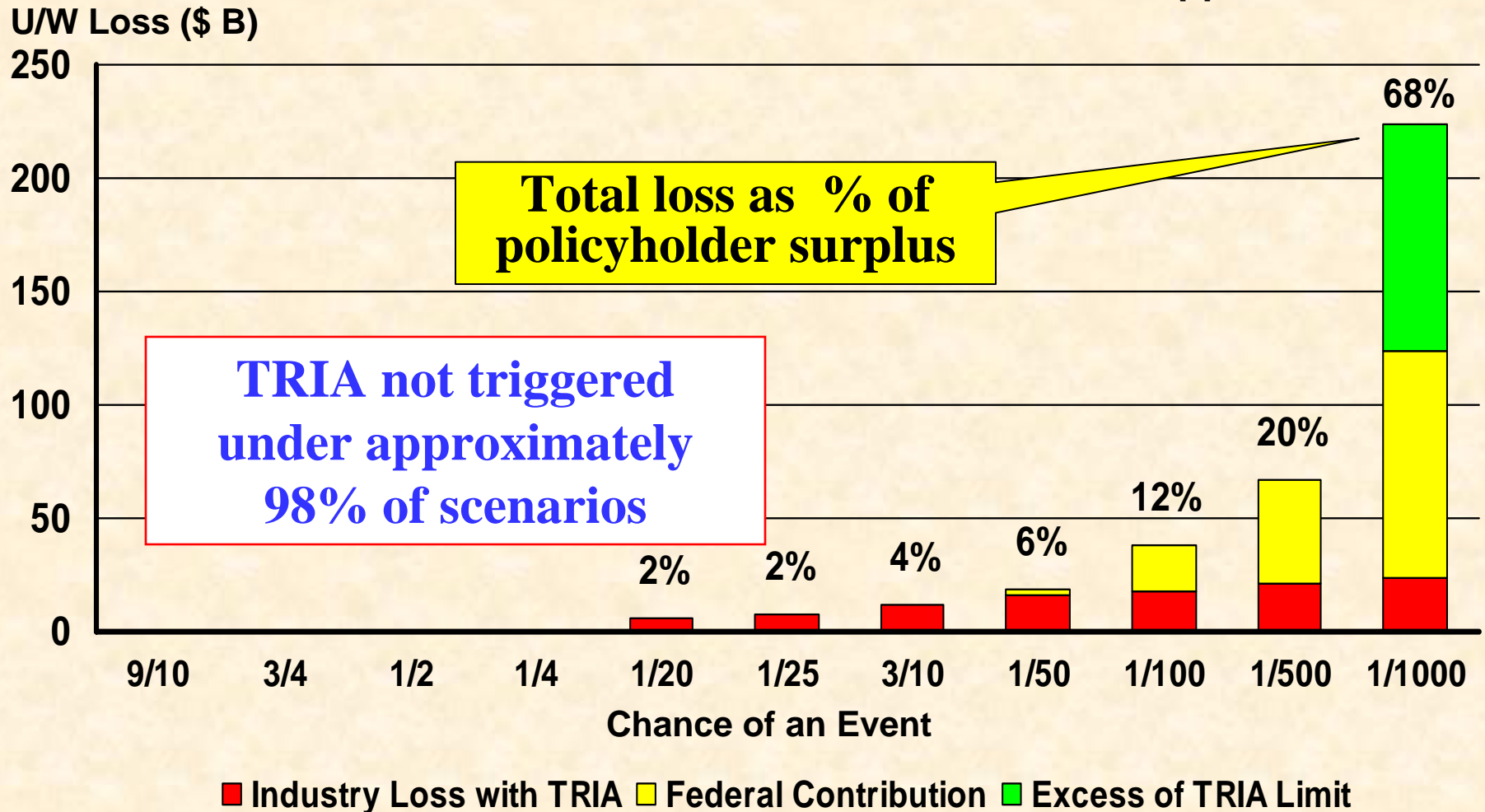
PORT SECURITY WAR GAME—ECONOMIC IMPACT

Exhibit 4



Under Most Scenarios TRIA Is Dormant But Vital When Triggered*

P&C U/W Loss With and Without TRIA Support



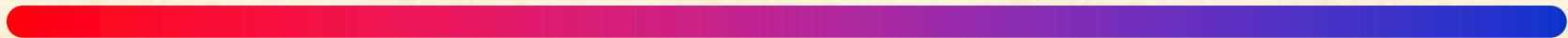
*Under the Terrorism Risk Insurance Extension Act (expired 12/31/07)

Source: EQECAT, NCCI

ERM & THE HOLISTIC APPROACH TO MANAGING TERRORISM RISK



*Preparing for
the Unknown*





“Traditional” Losses Arising from Terror Attack Scenarios

Risk	Concern
Property	<ul style="list-style-type: none">• Cost to repair, rebuild, replace
Casualty	<ul style="list-style-type: none">• Death/injury of workers• Death/injury customers & other 3rd parties
Liability	<ul style="list-style-type: none">• Claims of negligence (direct & 3rd party)
Business Interruption	<ul style="list-style-type: none">• Loss of income/extra expense may exceed insurance and company resources

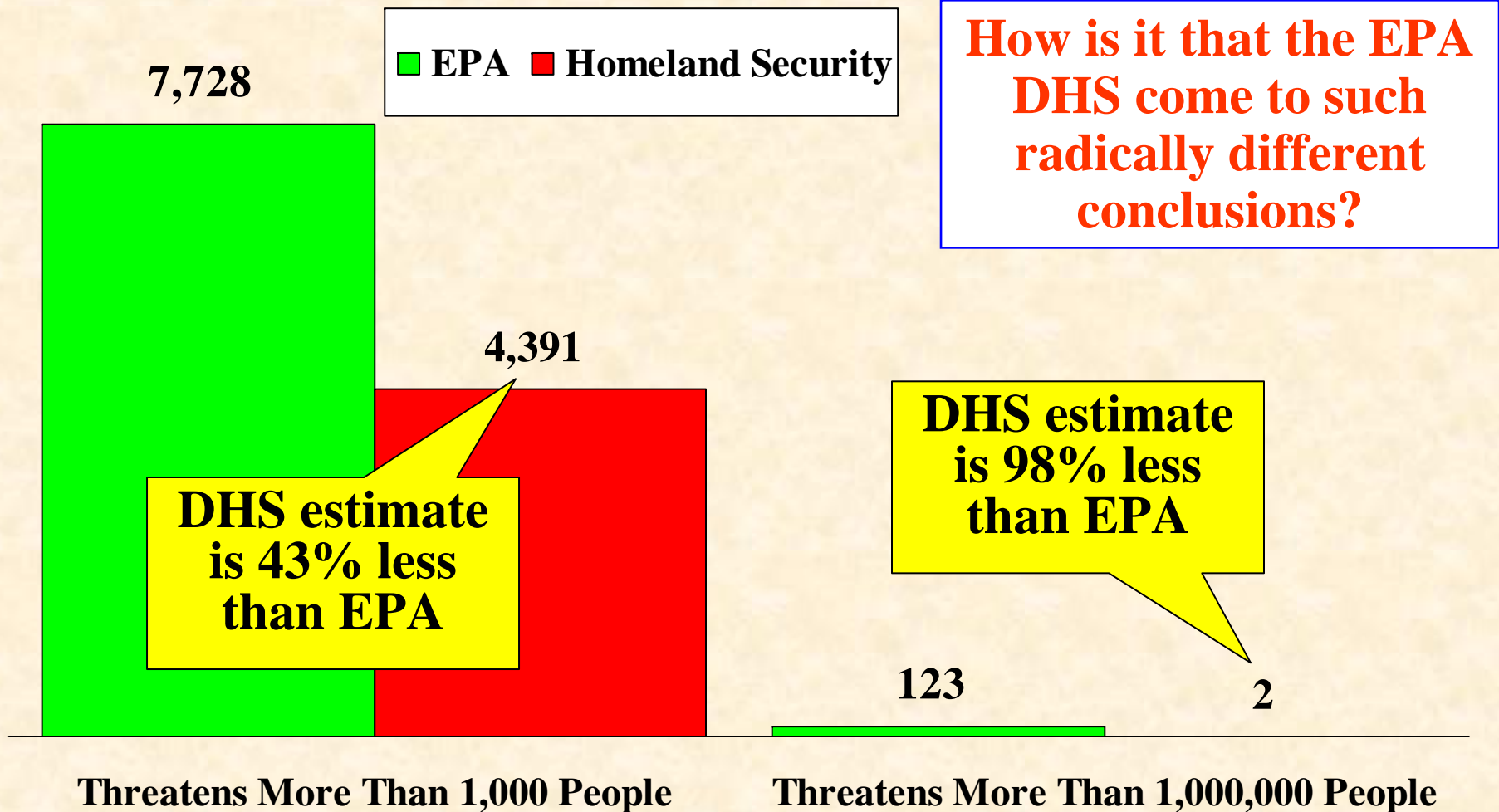


“Less Traditional” Losses Arising from Terror Attack Scenarios

Risk	Concern
Contingent Business Inter.	<ul style="list-style-type: none">•Upstream damage/dislocations interfere with ability to operate
D&O	<ul style="list-style-type: none">•Shareholders could allege management/directors did not take prudent steps to prevent attack or manage its effects
Latent Liability	<ul style="list-style-type: none">•Claims of disability/disease/death well after the event (e.g., first responders post 9/11)
Political Risk	<ul style="list-style-type: none">•Global political landscape and economic opportunities could shift•US government policy influences risk



Number of Chemical Plants that Could Threaten Nearby People



Source: EPA and Department of Homeland Security from the *Wall Street Journal*, "Chemical Plants Still Have Few Terror Controls," August 20, 2004, p. B1; Insurance Information Institute

Risks of Doing Business Internationally: Top 10 Country Rankings (2003-2006)

Ranking	Country	Business Partner Score*
1.	Afghanistan	10.0
2.	Equatorial Guinea	10.0
3.	Tajikistan	10.0
4.	Syria	10.0
5.	Iraq	8.0
6.	Serbia	7.7
7.	Colombia	7.0
8.	Angola	7.0
9.	Venezuela	7.0
10.	Vietnam	7.0

Business partner risk is the risk of entering into a transaction, project or other form of relationship with a business partner.

•Business Partner Score is a mean score, out of a maximum of 10, derived from three components: ventures halted or modified, transparency and integrity.

•Source: Aon 2007 Political and Economic Risk Map; The Risk Advisory Group

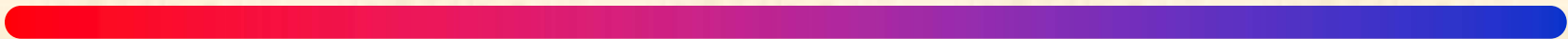


“Non-Traditional” Losses Arising from Terror Attack Scenarios

Risk	Concern
IT Risk	<ul style="list-style-type: none">• Infiltration, disruption or disruption• Could involve your IT, or up/downstream
Investment Risk	<ul style="list-style-type: none">• Terrorist attack will likely negatively influence investment opportunities, possibly for extended period
Reputational Risk	<ul style="list-style-type: none">• Loss of income/extra expense may exceed insurance and company resources
Regulatory Risk	<ul style="list-style-type: none">• Responses could impact performance
Economic Risk	<ul style="list-style-type: none">• State of the economy pre/post-attack influences performance

THE MARKET FOR TERRORISM INSURANCE

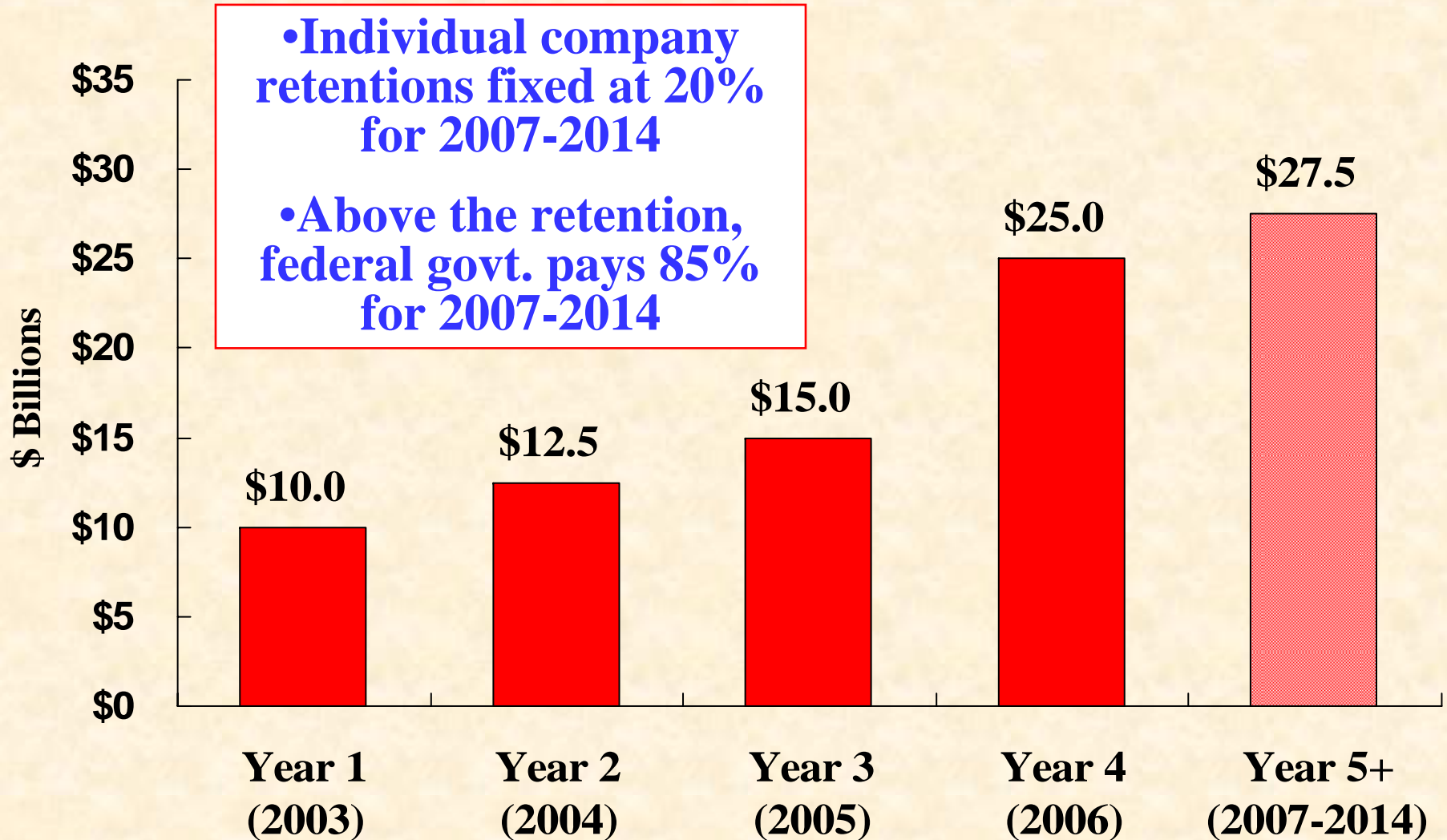
*TRIA Remains a
Runaway Success*





Insurance Industry Retention

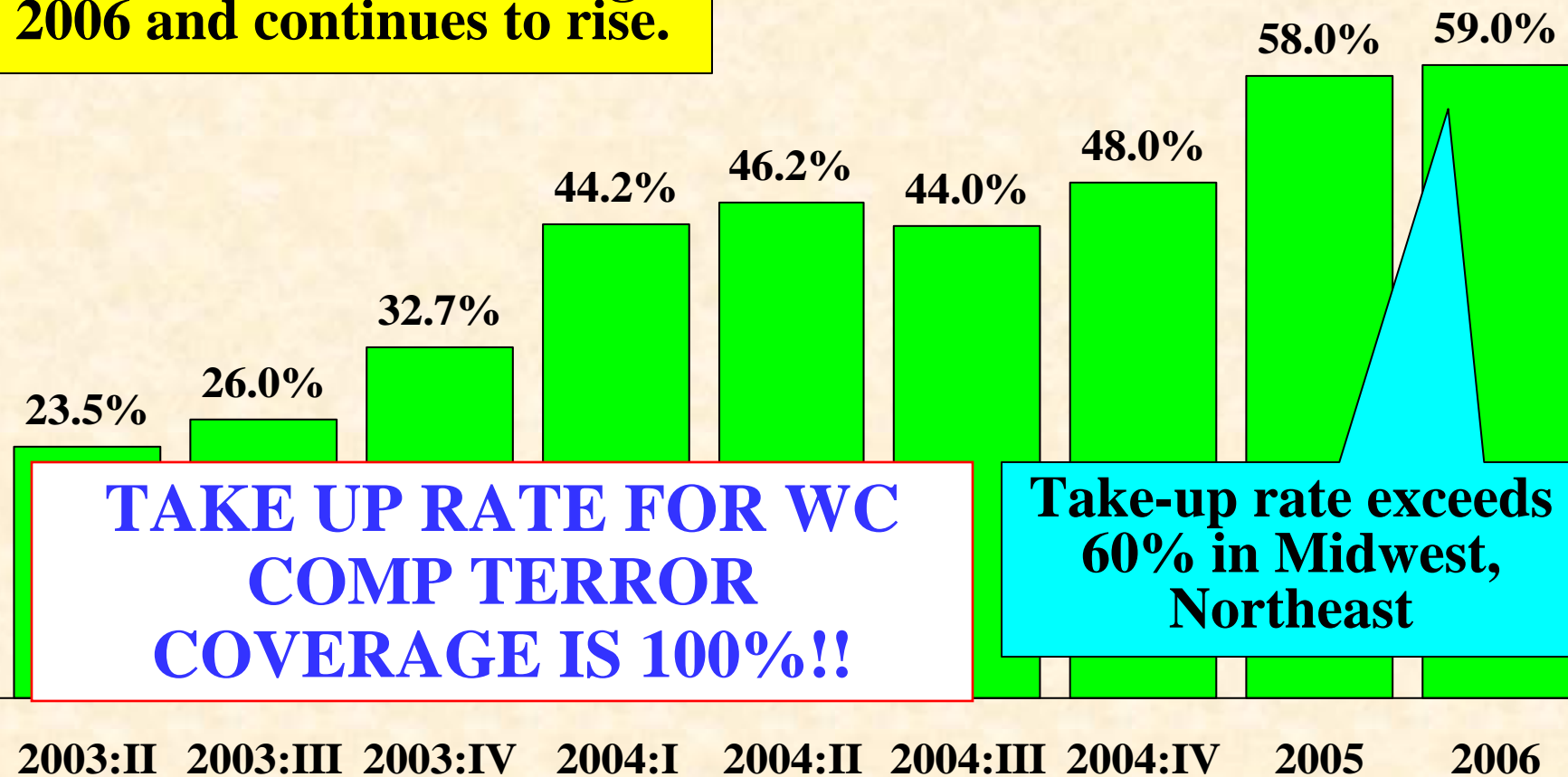
Under TRIA (\$ Billions)





Terrorism Coverage Take-Up Rate Rising

Terrorism take-up rate for non-WC risk rose through 2006 and continues to rise.



**TAKE UP RATE FOR WC
COMP TERROR
COVERAGE IS 100%!!**

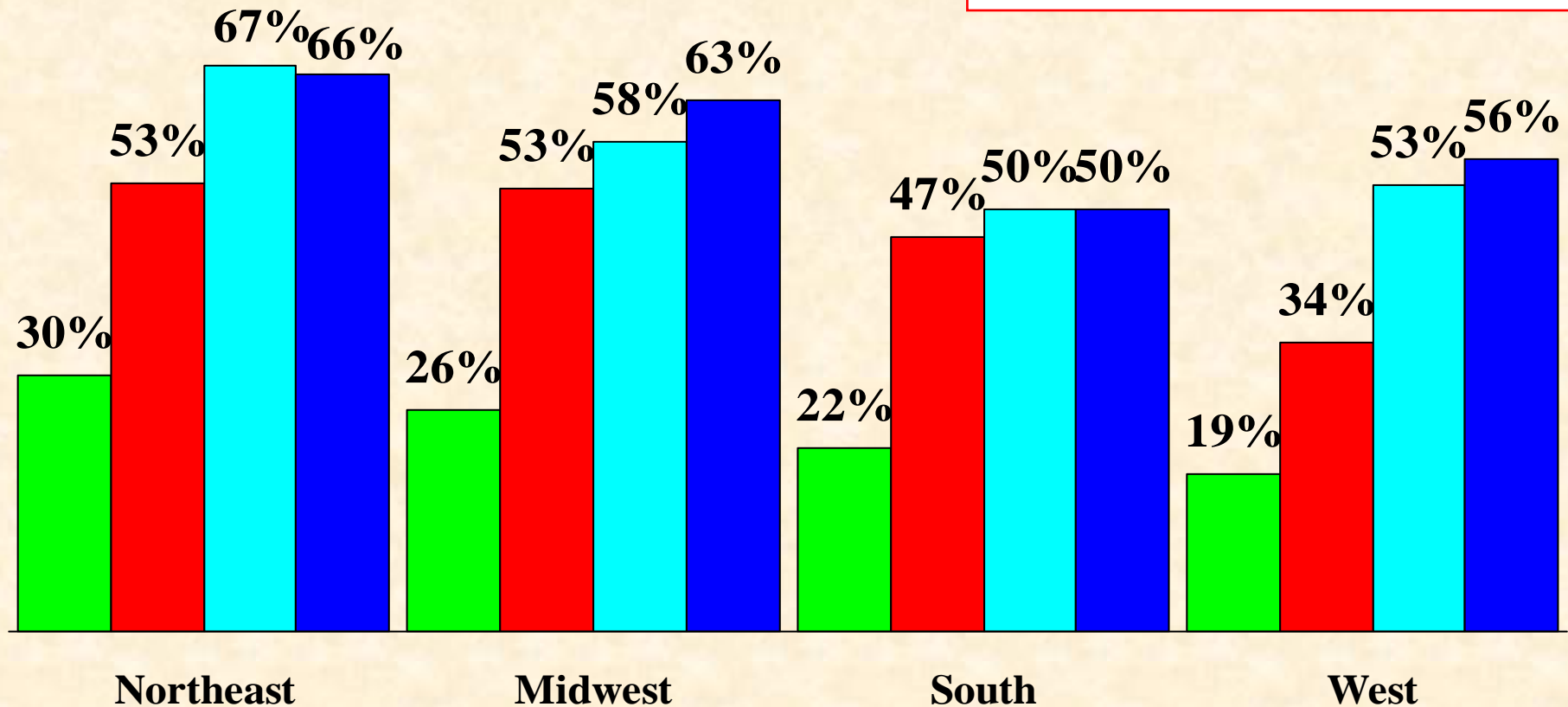
**Take-up rate exceeds
60% in Midwest,
Northeast**



Terrorism Coverage: Take-Up Rates by Region

■ 2003 ■ 2004 ■ 2005 ■ 2006

**Terrorism take-up rates
are highest in the
Northeast and Midwest**

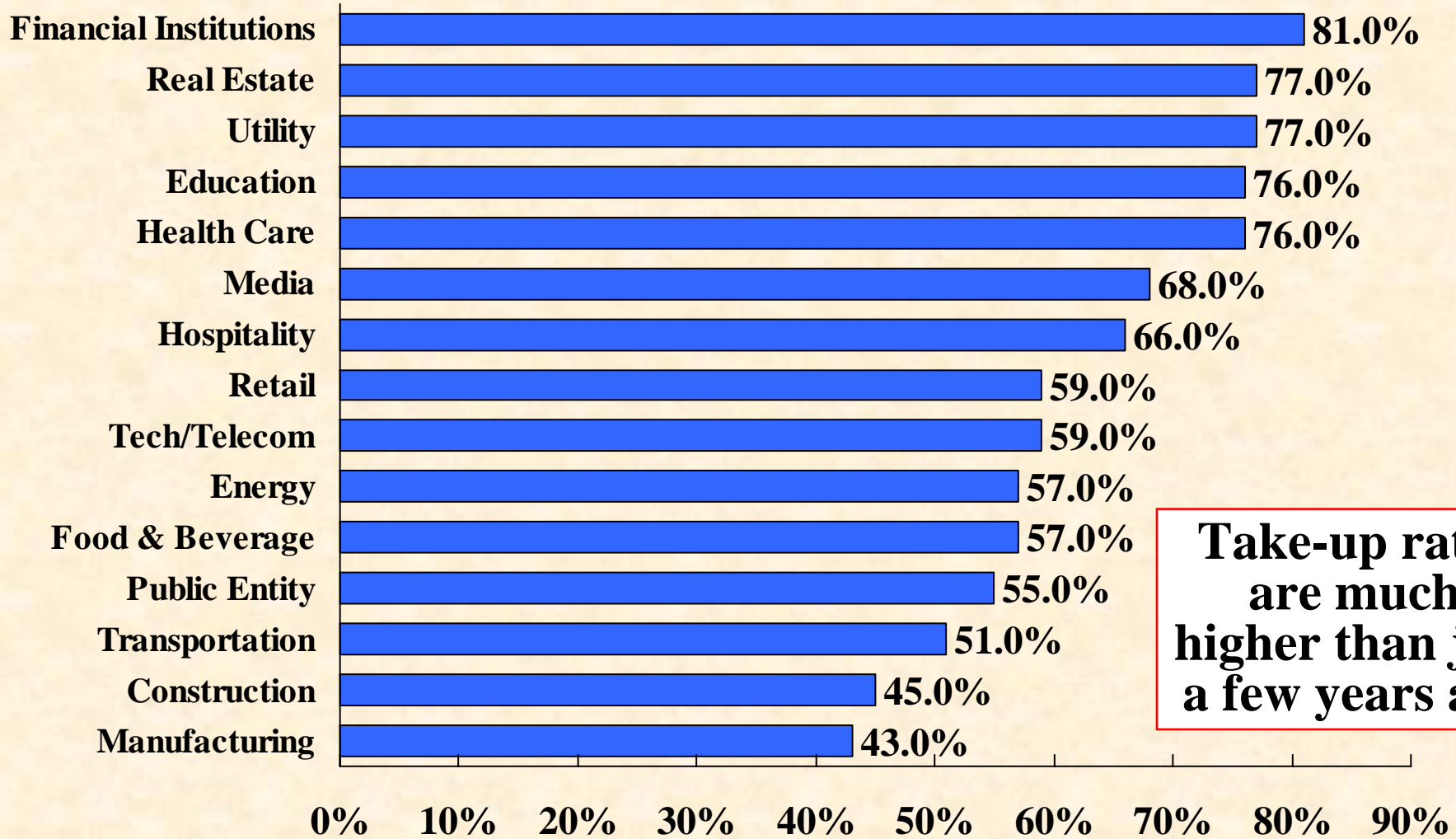


Source: 2006 Marsh Marketwatch Report; Insurance Information Institute



Terrorism Coverage:

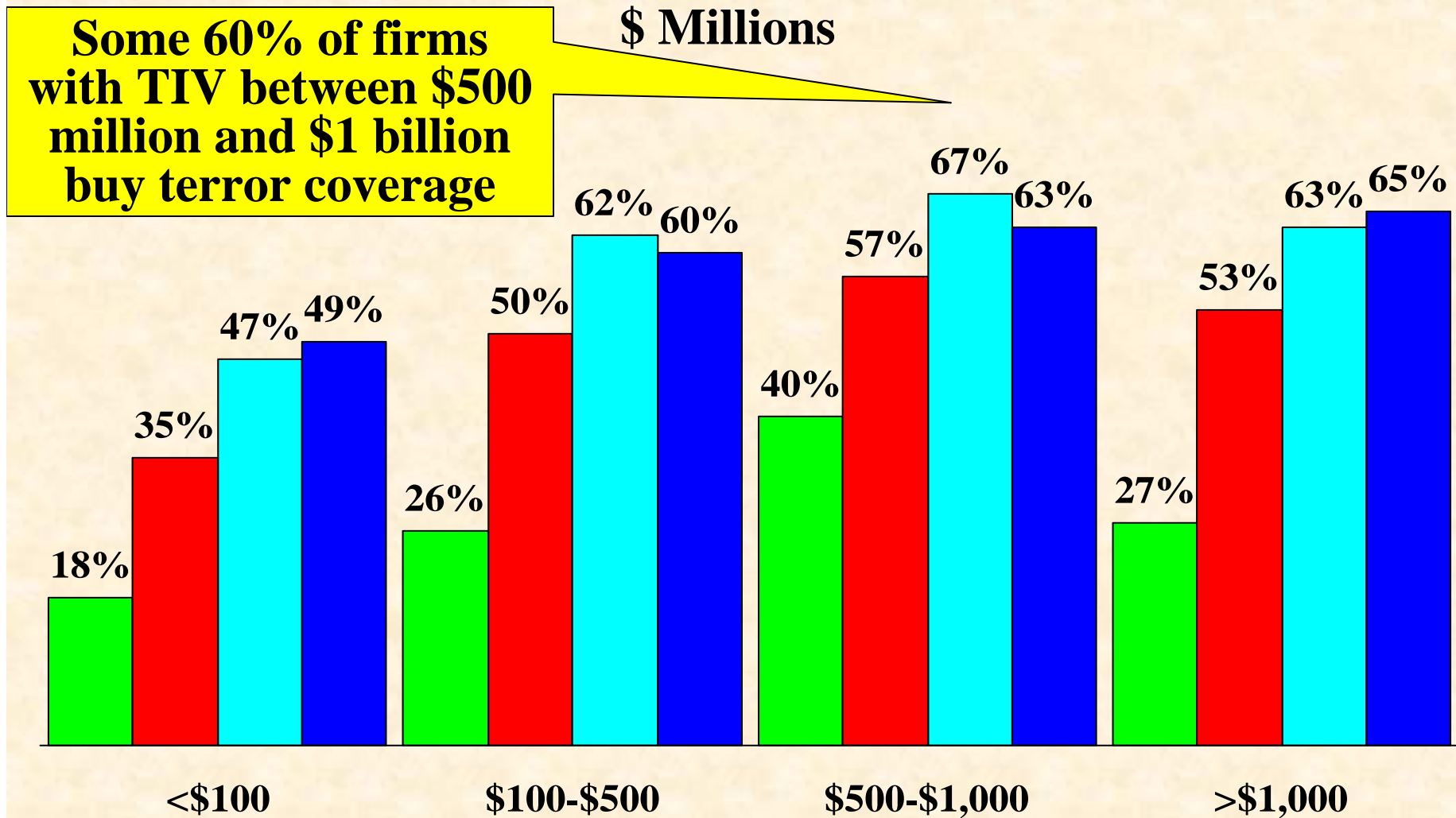
Take-Up Rates by Industry, 2006



**Take-up rates
are much
higher than just
a few years ago**



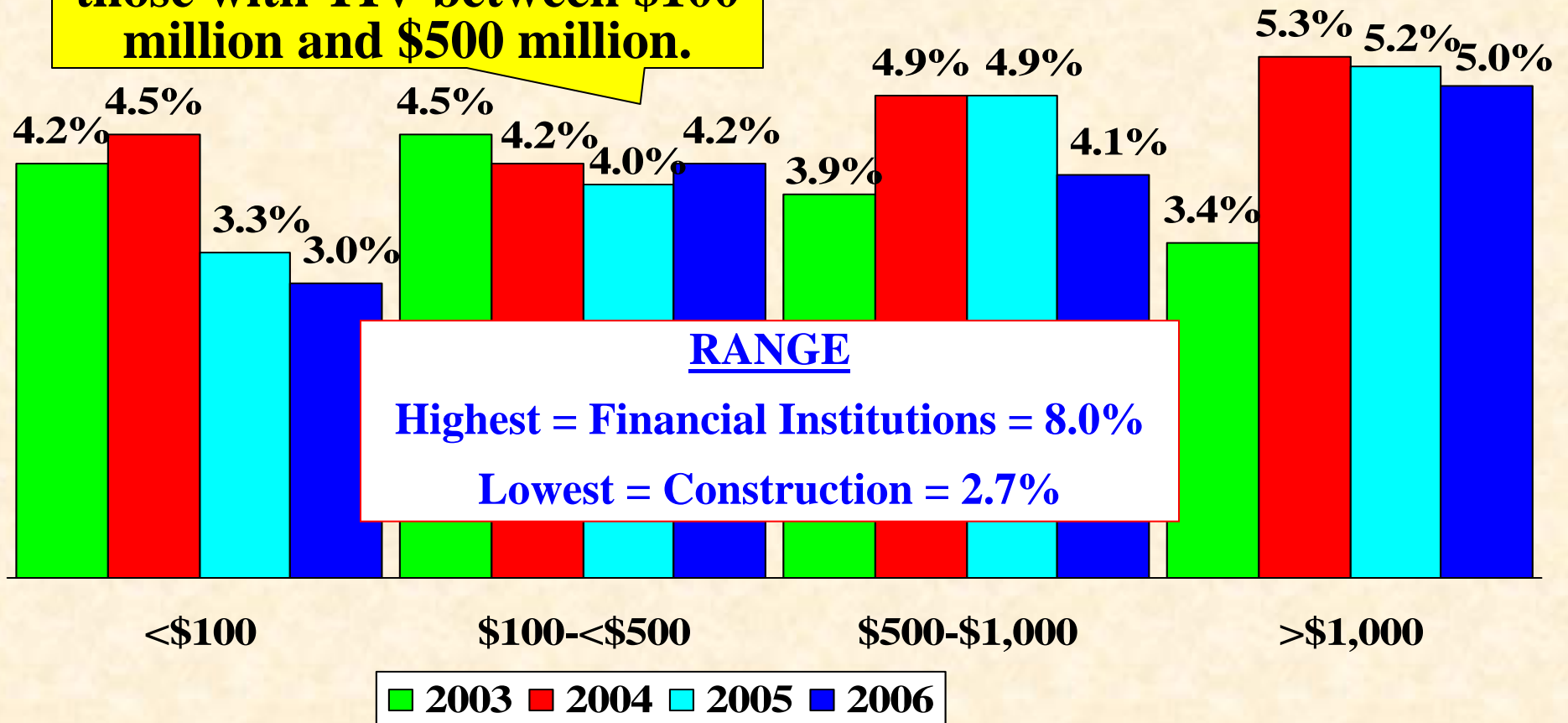
Terrorism Coverage Take-Up Rates by Total Insured Value (TIV)*



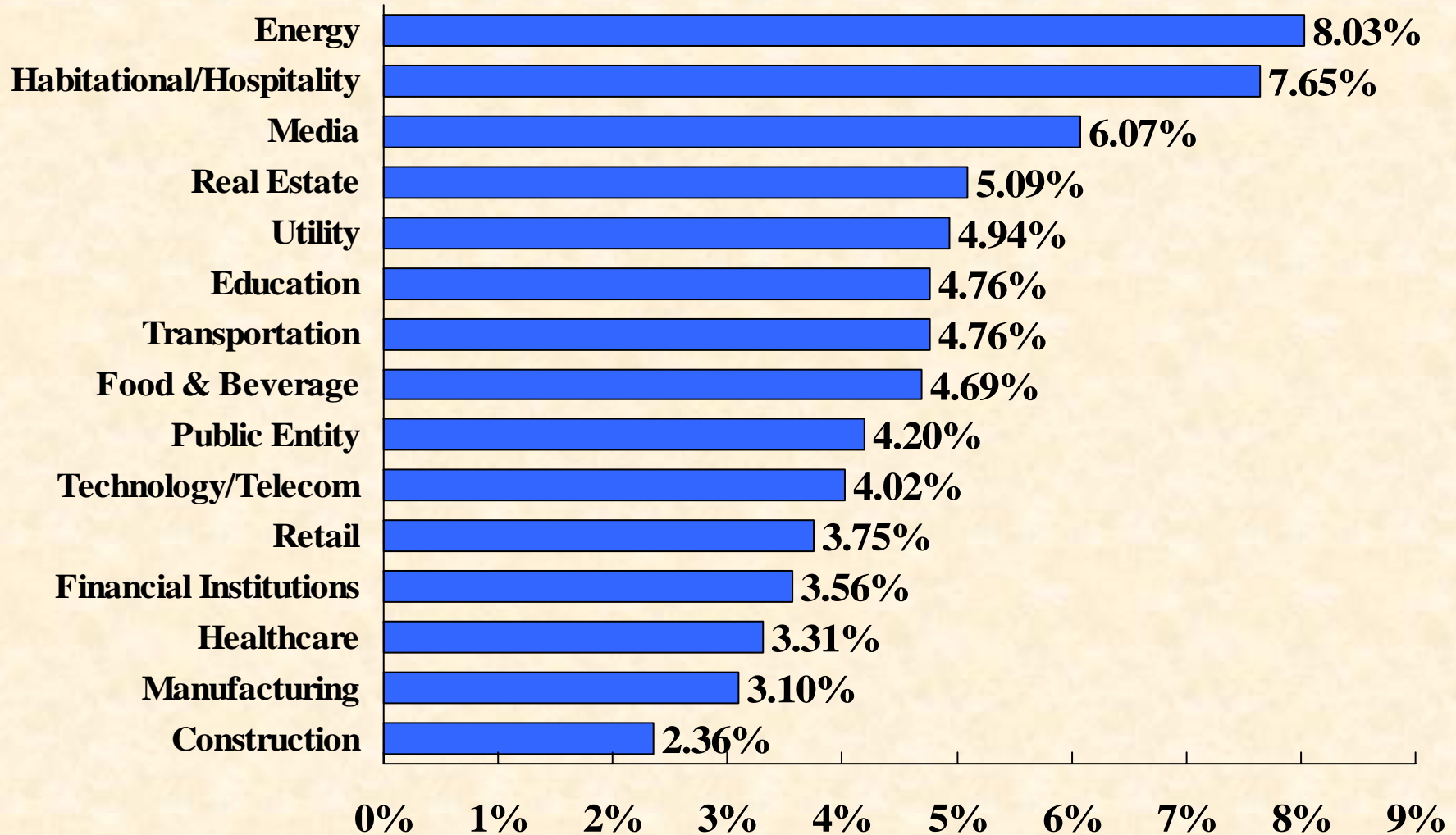
*Does not include firms that buy coverage through package policies.
Source: 2006 Marsh Marketwatch Report.; Insurance Information Institute

Terrorism Premium as a Percentage of Property Premium by TIV*

2006 saw modest reductions for all companies, except those with TIV between \$100 million and \$500 million.

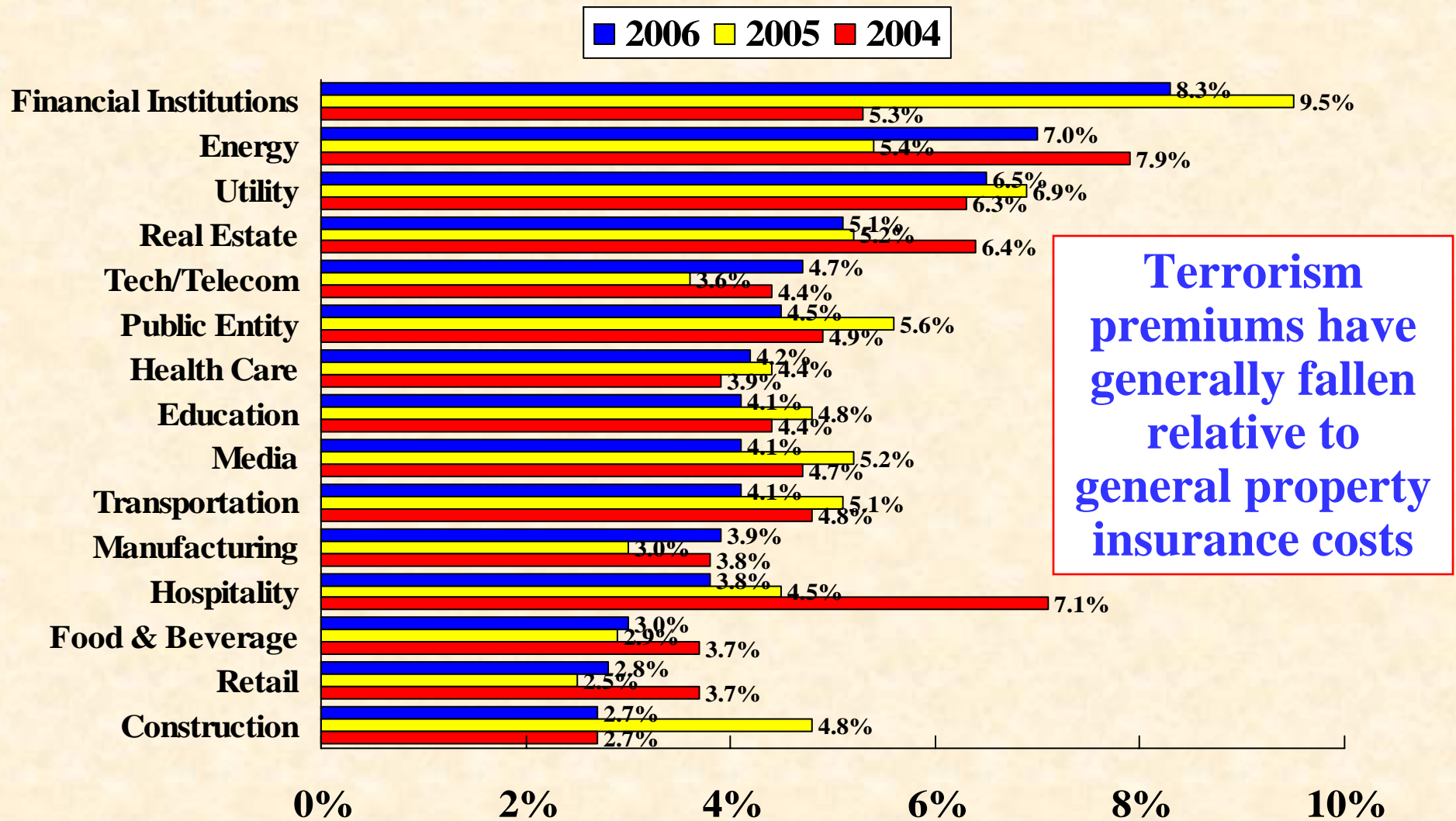


Terrorism Premium as Percentage of Property Premium, by Industry



Source: Marsh, Inc.

Terrorism Premium as Percentage of Property Premium, By Industry



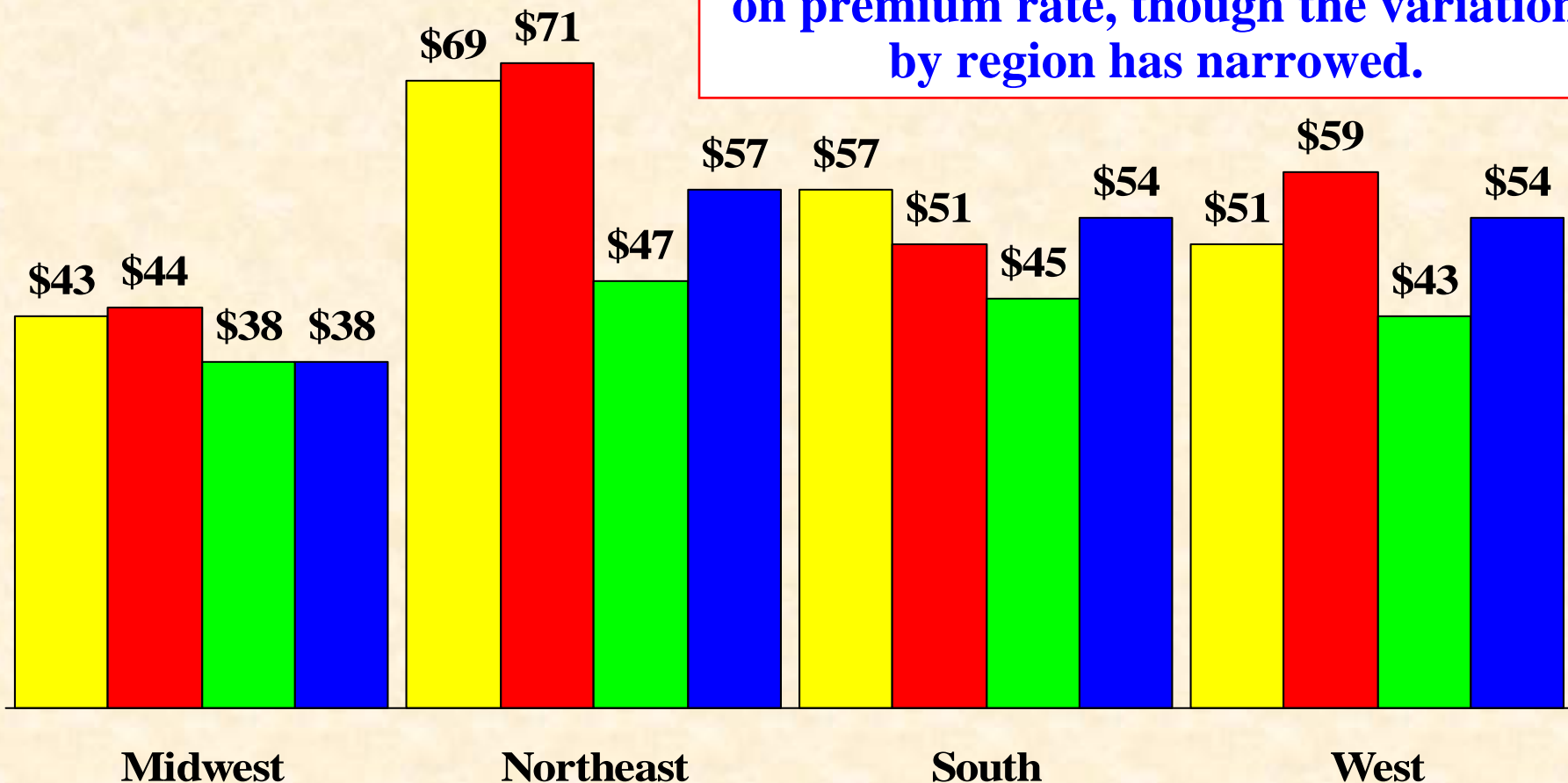
Terrorism premiums have generally fallen relative to general property insurance costs

Source: Marsh, Inc.



Terrorism Pricing: Median Rates by Region

Terrorism insurance continues to be most expensive in the Northeast based on premium rate, though the variation by region has narrowed.



Source: Marsh, Inc. 2006 Market Conditions and Analysis; Insurance Information Institute



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Terrorism Risk: Public and Private Solutions

Enterprise Risk Management Symposium

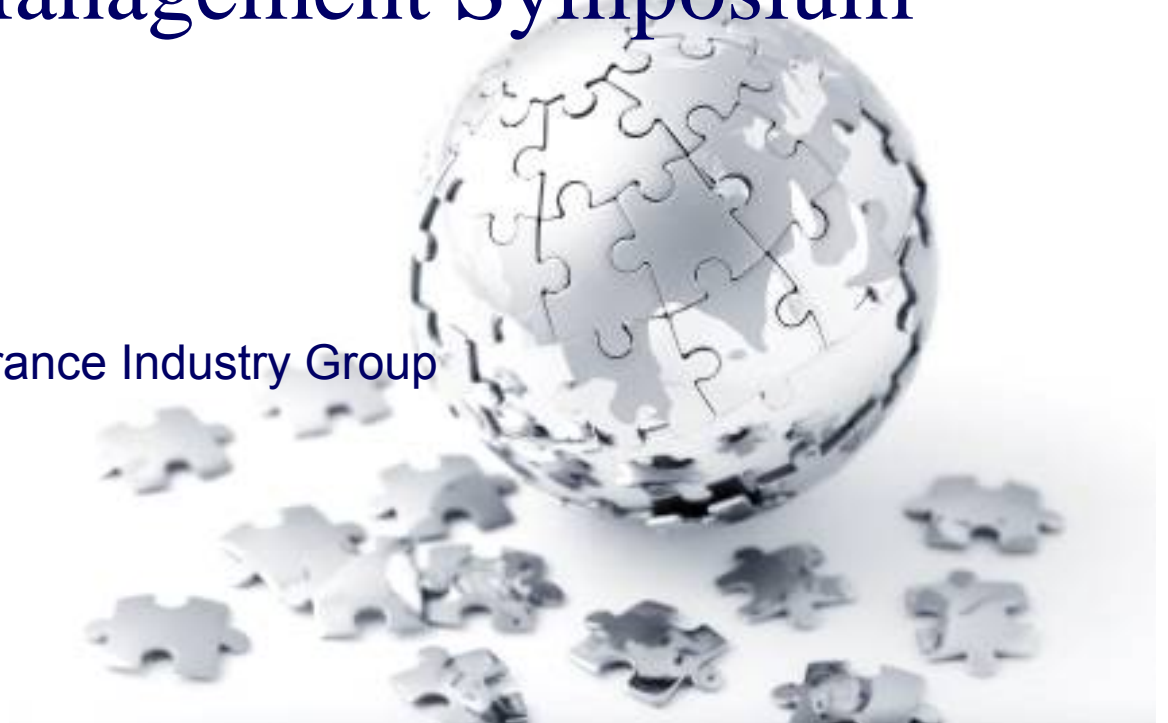
Howard Mills,

Director and Chief Advisor, Insurance Industry Group

Deloitte LLP

April 15, 2008

Audit • Tax • Consulting • Financial Advisory.



Agenda

- Beyond TRIA: The private market
- Terrorism risk by company size
- Reinsurers
- Solutions outside the U.S.

Beyond TRIA: The private market

- Private market coverage slowly growing
- Government backstop spurs take-up rates for terrorism coverage
- Challenges in writing coverage
- Still limitations: GAO report

Terrorism risk by company size

- Does it matter if you're a mountain or a mole hill?
- Large, multi-national insurers
- The case for mutual insurers

Reinsurers

- U.K.: Pool Re filling the gap
- Germany's Gesamtverband der Deutschen Versicherungswirtschaft
- Bermuda and beyond

TRIA and Pool Re comparison

	TRIA	Pool Re
Structure	Taxpayer sponsored	<ul style="list-style-type: none"> ▪ Mutual insurer; pays rates set by pool
Zones	Entire U.S	<ul style="list-style-type: none"> ▪ City; remaining areas of the U.K.
Program trigger	Losses must exceed \$100 million (2007)	<ul style="list-style-type: none"> ▪ None
Deductible	15 %	<ul style="list-style-type: none"> ▪ Primary insurer pays all; is reimbursed by pool for losses based on a set of variables
Industry wide retention rate	\$27.5 billion	<ul style="list-style-type: none"> ▪ Escalates by year, 2006 £200M per annum
Government role	U.S. Government acts as a reinsurer	<ul style="list-style-type: none"> ▪ Pool Re pays premium in retrocession agreement with HM Treasury ▪ Treasury provides cover in the event reserves are exhausted

Solutions outside U.S.

- Testing the waters: Industry survey of 34 countries
- Belgium
- France
- Netherlands
- Inaction in Canada, Italy

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Terrorism Risk

Presented by:
Lawrence H. Mirel

To:
Enterprise Risk Management (ERM) Symposium
Jointly Sponsored by the CAS, SOA, and PRIMA
Chicago, Illinois
April 15, 2008

Preparing for the Unknowable

The difficulties in assessing terrorism risk:

- Too few actual examples, too many possibilities.
- Unknown and unknowable targets.
- The limits of modeling; no matter how carefully reasoned and measured, a guess is still a guess.

Example: The ISO “Tier” Approach

- **Tier 1:** 4 cities: Washington DC, New York, Chicago and San Francisco.
 - Proposed rate for terrorism risk coverage: 10 cents per \$100 of value.
- **Tier 2:** 5 additional cities: Boston, Los Angeles, Seattle, Philadelphia and Houston.
 - Proposed rate: 1.8 cents.
- **Tier 3:** The rest of country.
 - Proposed rate: .001 (one mil).

Problems with ISO Approach

- Actual experience was ignored.
- Criteria for choosing targets debatable.
- Categories illogical.
- ISO was bound by rating territories, but terrorists are not.
- ISO was rating for insured buildings, but calculated for uninsured “targets.”
- ISO modeling method questionable and very narrow.

The Limits of Planning

No matter what you plan for, what actually happens is likely to be much different.

Example: DC Government disaster planning:

- Coordination problems.
- Planning for unknowables: What kind of attack? Where?
- Not planning for knowables: e.g. traffic gridlock.
- Ignoring the lessons of common experience.

Is Planning Useless?

Is Mitigation Impossible?

Planning should be based on realistic, not wishful, assumptions.

- Mitigation efforts should concentrate on areas under your control.
- Limited ability for you to *prevent* terrorist attack.
- Greater ability to *respond* if there is an attack.
- Even greater possibility to *recover* from an attack.
- Planning and mitigation efforts should be aimed primarily at response and recovery, rather than prevention.

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