

Corporate Demand for Terrorism Insurance: An Empirical Analysis

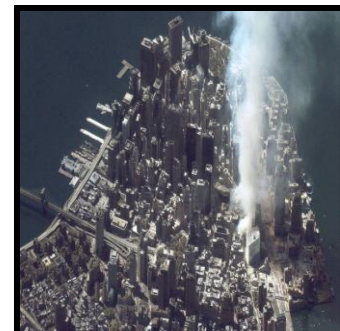
Erwann O. MICHEL-KERJAN

The Wharton Business School (USA) and Ecole Polytechnique (France)
Chairman, OECD High Level Advisory Board

(joint work with P. Raschky and H. Kunreuther)



OECD International Conference
Paris, France – June 1-2, 2010



NOVEMBER 1, 2009



Mammogram
Advice, plus the
Year in Health, A to Z

Joe Klein on
The Tsunami of
Obama Criticism



A Photo Gallery
Of Rescued
Fighting Dogs

TIME

The Decade From Hell

And why the next one
will be better

BY ANNY SEAWER



www.time.com

These issues are moving up to the top agenda in governments and of many boards of Directors

Economic Report of the President



Transmitted to the Congress February 2007

Together with the Annual Report
of the Council of Economic Advisers

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1. Motivation for the Study

Several years after 9/11, what is the cost and demand for terrorism insurance?

More generally, what do we know about corporate demand for *catastrophe* and *non-catastrophe* insurance?

What is the impact of federal intervention into this new market?

Key Contribution

First study ever that compares
corporate demand for property and
catastrophe risk

Key Findings

- 60% of large corporations in the US have TRIA insurance, but 40% of them have declined that coverage; Larger companies more likely to purchase coverage
- Property insurance costs 8 times more than terrorism insurance for the same coverage nationally.
- Corporate demand for *catastrophe* insurance is found to be more price inelastic (i.e. less sensitive to price) than for non-catastrophe insurance (different than results on homeowners’).

Key Findings (con't)

- U.S. Federal intervention made coverage widely *available*
- But acts as a *disincentive* for insurers to diversify their exposure because they benefit from free federal reinsurance and for private reinsurers to re-enter
- Our analysis shows is a business opportunity for *reinsurers to re-enter* America's terrorism insurance market: this would not severely impact national coverage against terror (elasticity of -0.24)

Agenda

1. Motivation for the Study and Key Findings ✓
2. Data on 1,808 Large Corporations
3. Some of the Results
4. Policy Implications
5. A Role for the OECD

2. Data for this Study

In 2005-2006, we worked with Marsh (U.S.), Extremus (Germany) and PoolRe (U.K.) on aggregate data to conduct the first international comparison of terrorism insurance markets - (Michel-Kerjan and Pedell, 2006; JACF)

Main conclusion: Terrorism insurance cost was up to 4 times *higher* in Germany and the UK than it was in the U.S. (and still is). Why?

- Free federal reinsurance in the US (limited cost of capital)
- US insurers might sell that coverage very cheap to keep their clients

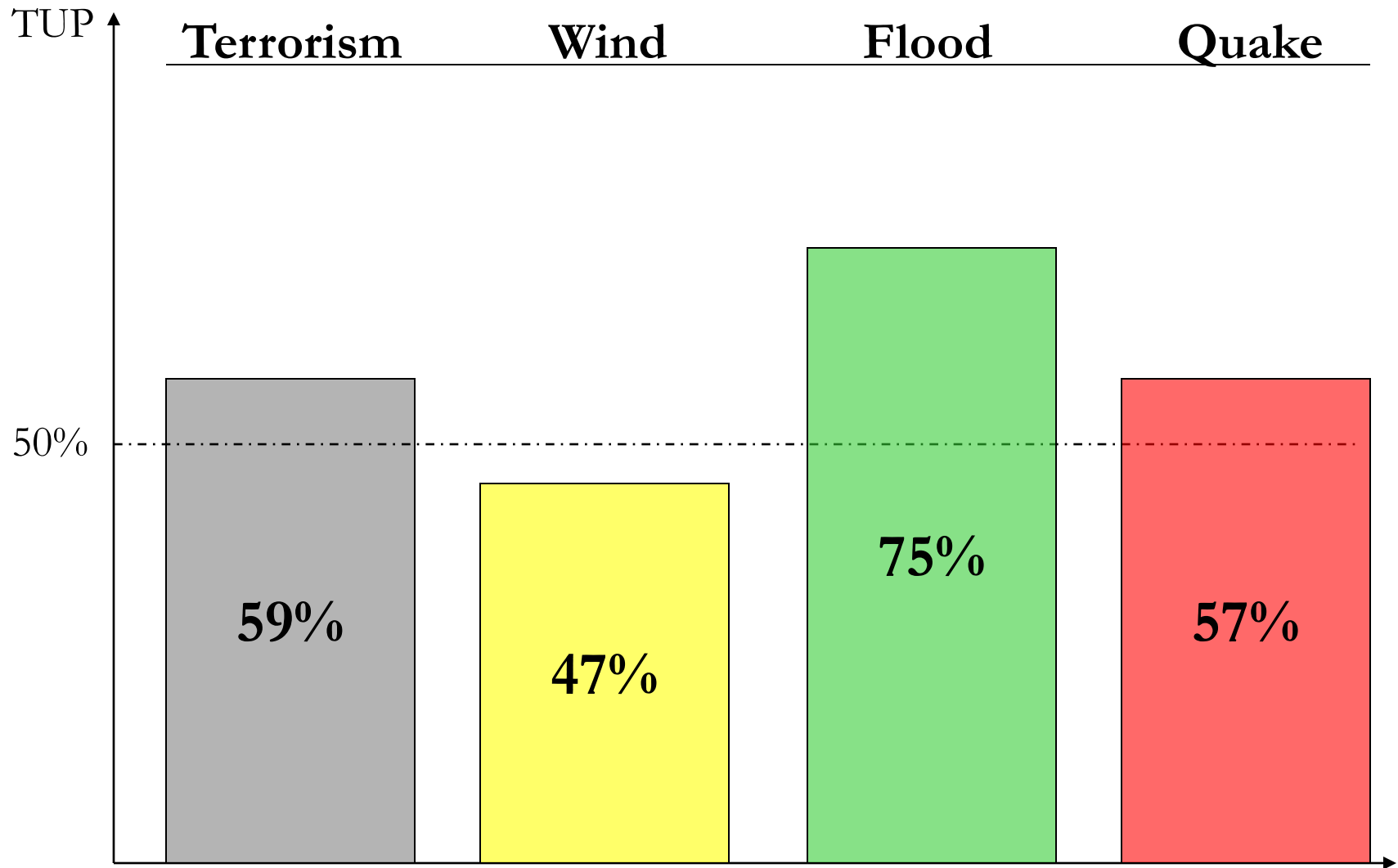
Recently we accessed the entire database of Marsh insurance contracts – Property + Terrorism

- **1,885 large companies in the United States in 2007**
 - in 47 states
 - 20 industries (transport, telecom, defense, chemicals, ...)
- **Assets range: \$1 million - \$93 billion (mean: \$1.7bn)**
- **Information on:**
 - Property insurance: Premium, Limit, Deductibles
 - Terrorism Insurance Coverage: Premium, Limit, Deductibles

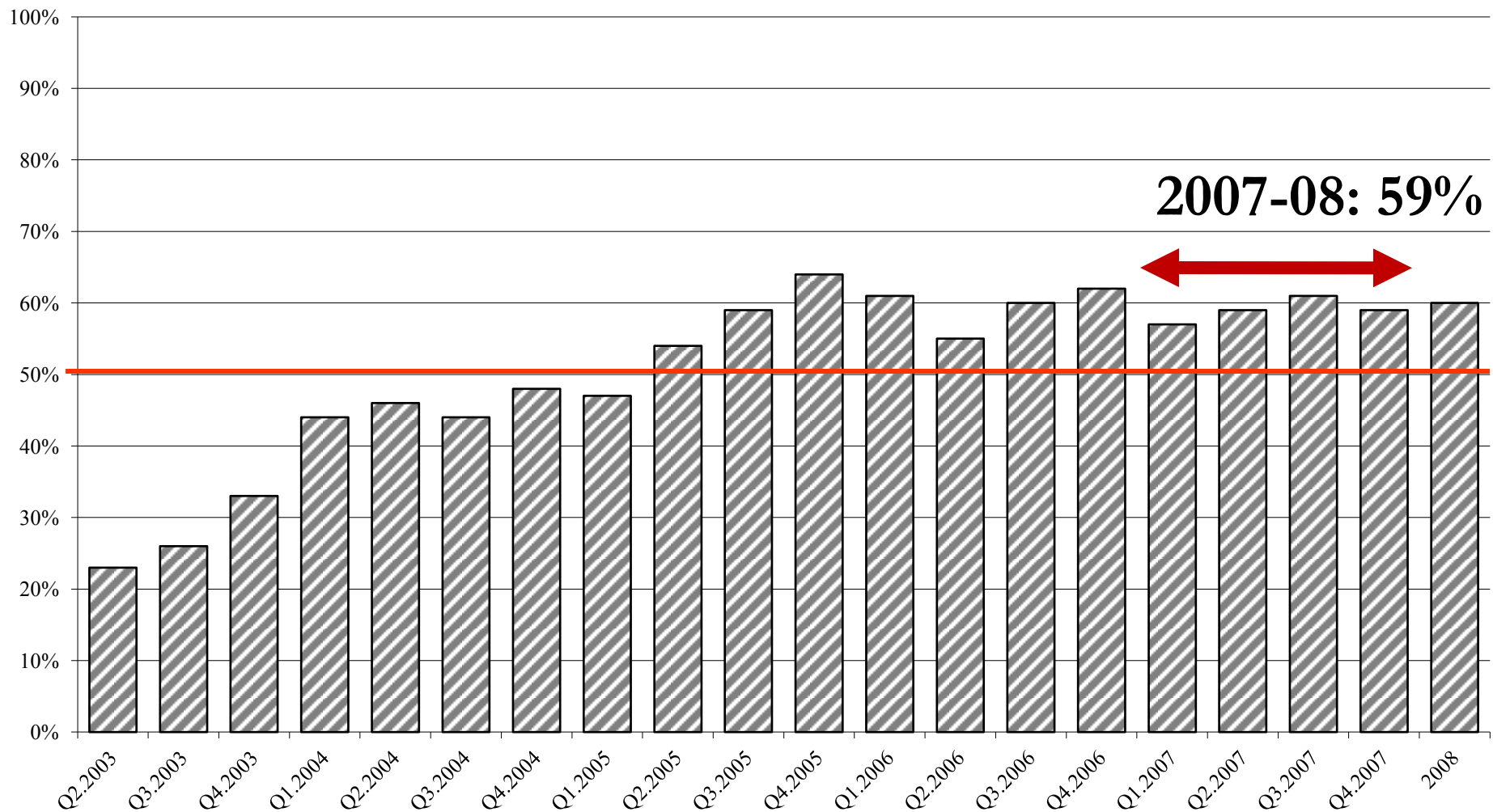
The Questions We Tried To Answer

- What do we know about take-up rate?
- How does TRIA-coverage cost differ from property insurance cost?
- What's the premium elasticity of corporate demand for terrorism insurance (CDFI)? How does it compare to elasticity for standard property insurance?
- Do these results change depending on location?
Is there a “*New York effect*”?

How Does It Compare to Corporate Insurance Take-Up Rate (TUR) for Other Cat Risks?



Putting This Number into Historical Perspective: Evolution of Terrorism Insurance Take-up Rate for Large U.S. Commercial Firms (nationwide)



Data from Marsh; between 1,600 and 1,800 firms depending on the year

3. Some of the Results – Costs

Companies with TRIA-type coverage – All regions

Variable	Mean	Std. Dev.	Min.	Max.
Premium TRIA	\$111,963	400,815	21	5,877,503
Premium Property	\$1,238,668	2,503,894	2,106	29,731,212
Premium per \$1,000 of TRIA insurance	\$0.592	1.645	7.76E-04	22.195
Premium per \$1,000 of property coverage	\$4.848	7.973	0.290	99.948

3. Some of the Results – Costs (cont'd.)

New York Metro only

Variable	Mean	Std. Dev.	Min.	Max.
Premium_TRIA	\$420,687	917,863	1,255	5,877,503
Premium_Property	\$2,287,739	3,741,100	16,140	29,731,212
Premium per \$1,000 of TRIA insurance	\$1.362	2.393	0.0048	13.049
Premium per \$1,000 of property coverage	\$6.149	8.315	0.323	54.813

Demand & Supply Analysis

Advanced econometric techniques to generate a demand-supply system of equations

Integrate characteristics of the firms that demand terrorism insurance and of those that sell it

Demand and Supply Combined

	Full sample				New York				Other regions			
	Terrorism		Property		Terrorism		Property		Terrorism		Property	
	Supply ^c	Demand ^d	Supply ^c	Demand ^d	Supply ^c	Demand ^d	Supply ^c	Demand ^d	Supply ^c	Demand ^d	Supply ^c	Demand ^d
ln(TIV)		-0.062***		-0.104***		-0.025		-0.102***		-0.072***		-0.107***
		(0.010)		(0.006)		(0.049)		(0.020)		(0.010)		(0.007)
ln(Premium/ Limit)		-0.241***		-0.292***		-0.249***		-0.236***		-0.247***		-0.296***
		(0.014)		(0.012)		(0.067)		(0.038)		(0.015)		(0.013)
Frac Limit	0.044		0.137*		-0.037		0.190		0.040		0.142*	
	(0.099)		(0.070)		(0.668)		(0.392)		(0.112)		(0.081)	
ln(limit)	-0.212***		-0.332***		-0.079		-0.359***		-0.240***		-0.339***	
	(0.039)		(0.024)		(0.154)		(0.090)		(0.039)		(0.025)	
Coverage	-3.216***		-2.349***		-3.644***		-2.659***		-3.011***		-2.329***	
	(0.156)		(0.086)		(0.487)		(0.306)		(0.158)		(0.090)	
ln(Assets)	0.001		0.013		0.008		0.018		-0.002		0.009	
	(0.010)		(0.011)		(0.050)		(0.034)		(0.013)		(0.013)	
Liquidity	-0.000		-0.000		0.000		-0.001		-0.000		-0.000	
	(0.000)		(0.000)		(0.000)		(0.002)		(0.000)		(0.000)	
Industry FE ^a	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Region FE ^b	Yes	Yes	Yes	Yes	No	No	No	No	Yes	Yes	Yes	Yes
Obs.	441	441	441	441	65	65	65	65	376	376	376	376
R ²	0.576	0.490	0.672	0.713	0.626	0.408	0.627	0.764	0.584	0.527	0.681	0.717

How Sensitive Are These Firms in Our Sample to Terror Insurance Premiums?

We find that corporate demand for cat coverage is *more premium inelastic* (-0.24) than for property coverage (-0.29) ; **If price increases by 10% purchased quantity decreases by only 2.4%**

Firms are *less* sensitive to terror insurance costs than they are to property insurance costs

Even though price is much higher in the NY Metro Area price elasticity is about the same (-0.249)

Possible reasons:

- Requirements to buy terror coverage (e.g. D&O) – “you need to have it”
- Some large companies see themselves as a “trophy target”
- Incentive systems within the firm (Greenwald and Stiglitz, 1990, 1993); managers are risk-averse
- Cost of coverage is cheap (soft market)

Summary

	Standard Property Insurance
Price (National sample)	Price: \$4.8/\$1,000 (implicit perceived likelihood: 1-in-210)
Price Elasticity	Elasticity: -0.292
Price (New York Metro)	Price: \$6.15/\$1,000 (implicit perceived likelihood: 1-in-160)
Price elasticity	Elasticity: -0.236

	Terrorism Insurance
Price	Price: \$0.592/\$1,000 (implicit perceived likelihood: 1-in-1700)
	Elasticity: -0.241
Price	Price: \$1.32/\$1,000 (implicit perceived likelihood: 1-in-730)
	Elasticity: -0.249

Agenda

1. Motivation for the Study and Key Findings ✓
2. Data on 1,808 Large Corporations ✓
3. Some of the Results ✓
4. **Business and Policy Implications**
5. **A Role for the OECD**

4. Policy Implications

- Major concerns as to whether the **4 out of 10** corporations in the US that **declined TRIA coverage** would have the capacity to sustain a large-scale terrorist attack if it happened tomorrow (they are typically the smaller ones in our sample).
- Solvency ratio (long-term) has a negative impact on the demand for insurance; ability to self-insure is used as a substitute for terror coverage

4. Policy Implications (cont'd.)

- Federal intervention leads insurers to high concentration of exposure (possible “**Gaming TRIA strategy**”)
- Compared to what we see in other countries, are U.S. insurers charging enough for terrorism today or **has this coverage become underpriced?**
- How does this compare to other international markets?
- What will happen in the aftermath of a new attack?

5. A Role for the OECD

- Help coordinate international data gathering across OECD member countries (market benchmark)
- Annual effort to develop neutral, reliable and trustable source of information for all stakeholders
- Over time generate a better view on market trends and policy options to overcome current and future challenges (future attacks)

Contact

On the web @ <http://erwannmichelkerjan.com>

Assistant: Carol Heller (hellerc@wharton.upenn.edu)