

**CONFERENCE ON CATASTROPHIC RISKS  
AND INSURANCE**

**22-23 November 2004**

**MANAGING ECONOMIC EXPOSURES OF  
CATASTROPHE AND TERRORISM RISK:  
INTERNATIONAL FINANCING SOLUTIONS**

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**Powerpoint presentation**

*This document is circulated for Session 2 of the Conference on Catastrophic Risks and Insurance, to be held on 22-23 November 2004 at the OECD Headquarters, 2 rue André Pascal, 75016 Paris, starting at 9:00 a.m.*

*For further information on this conference, please contact Cécile Vignial, Financial Markets Division ([Cecile.Vignial@oecd.org](mailto:Cecile.Vignial@oecd.org)), or Yosuke Kawakami or Morven Alexander, Outreach Unit for Financial Sector Reform ([Yosuke.Kawakami@oecd.org](mailto:Yosuke.Kawakami@oecd.org) or [Morven.Alexander@oecd.org](mailto:Morven.Alexander@oecd.org))*

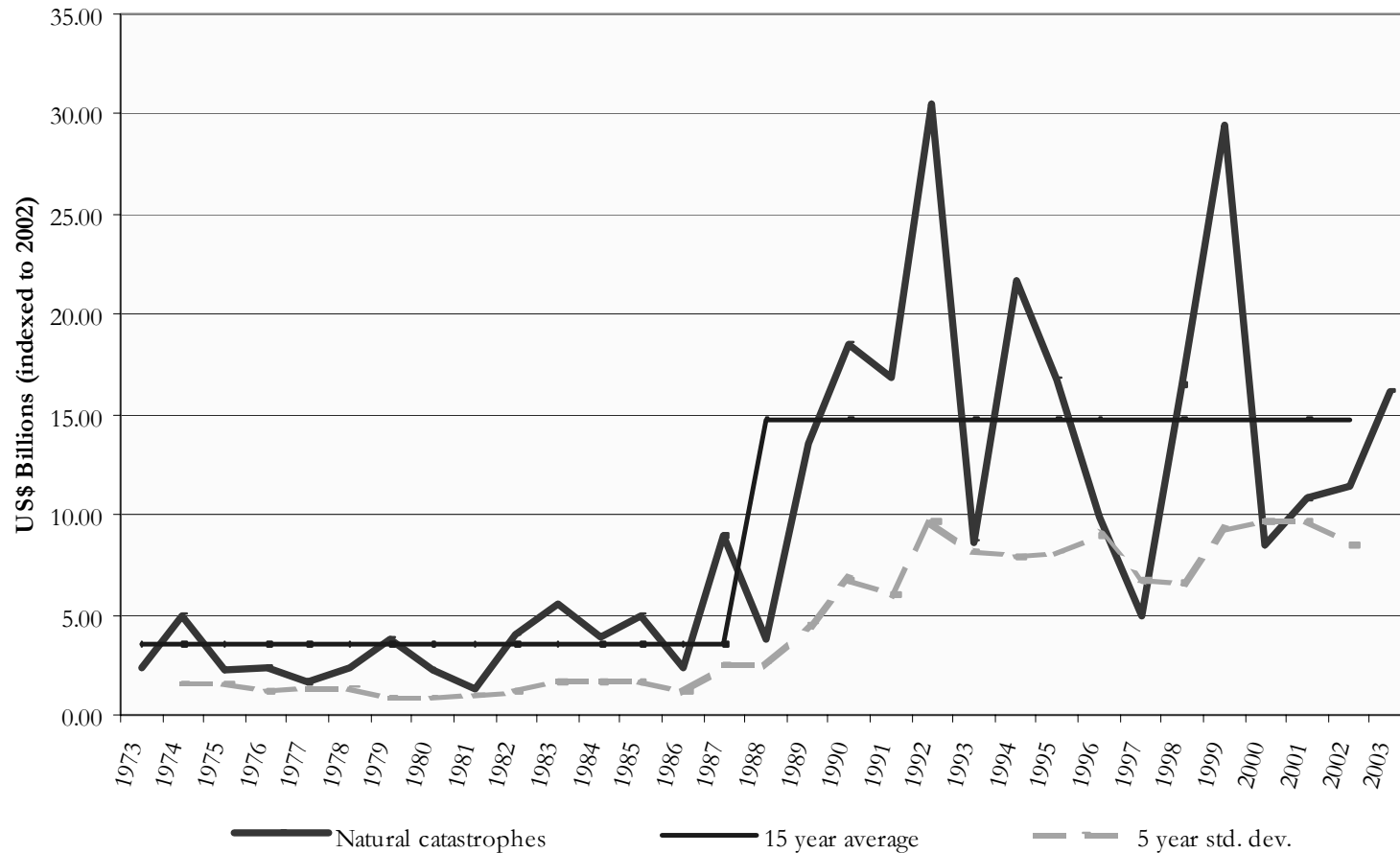
Managing Economic Exposures of  
Catastrophe and Terrorism Risk:  
**International Financing Solutions**

**Torben Juul Andersen**  
Copenhagen Business School  
Denmark



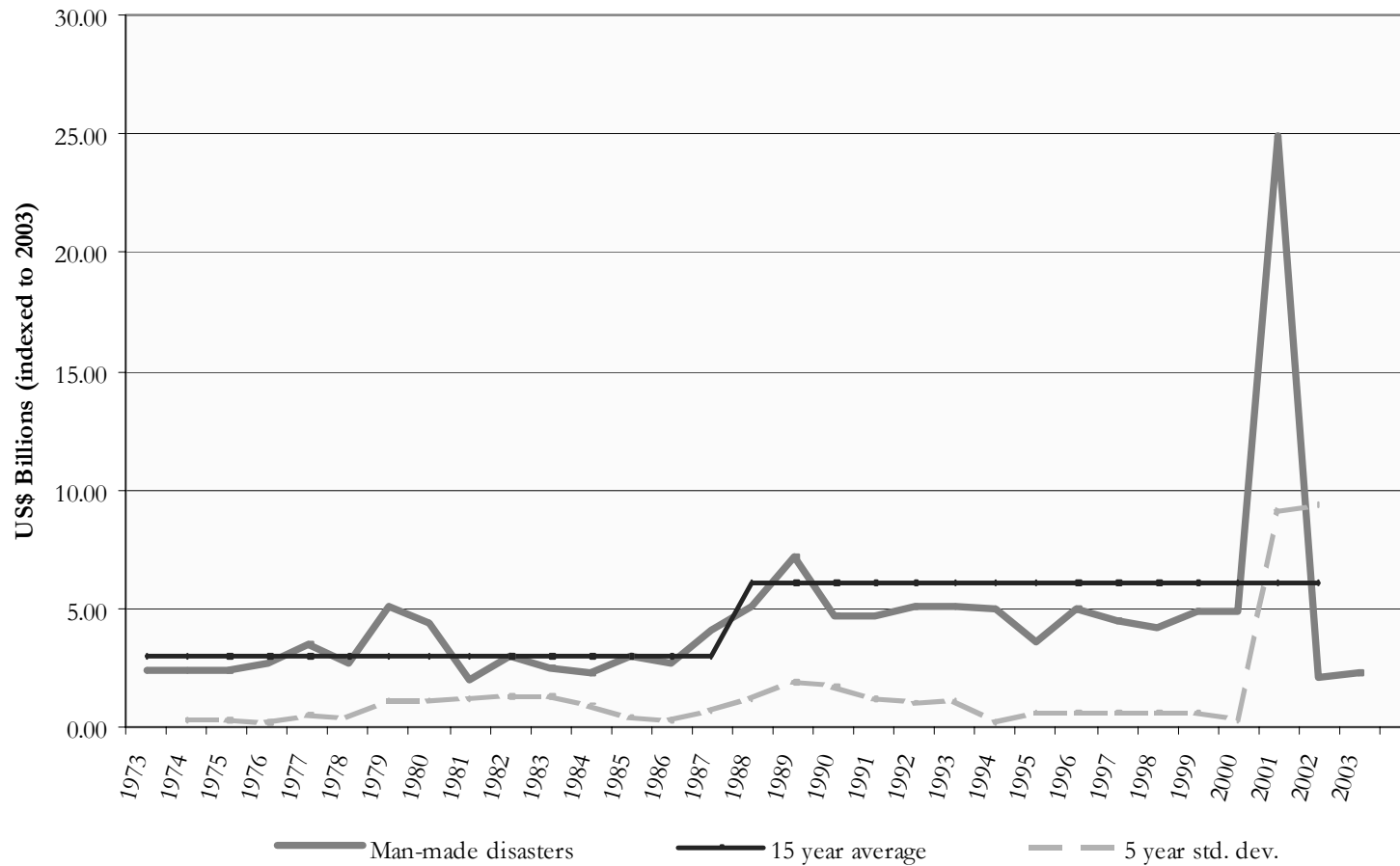
CONFERENCE ON CATASTROPHIC RISKS AND INSURANCE  
November 22-23, 2004

# Direct Economic Losses from Natural Catastrophes



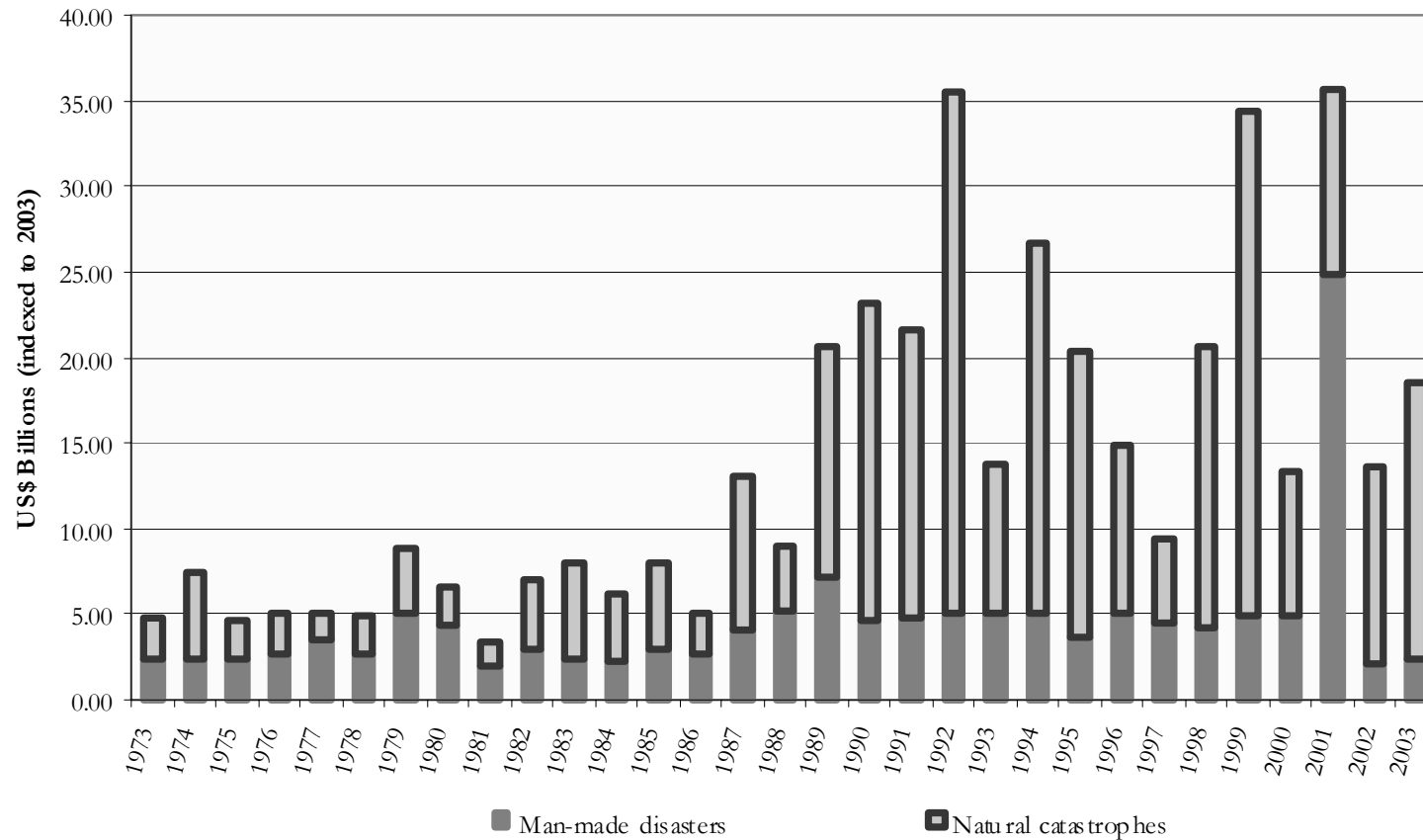
Source: Sigma No. 1/2004, *Natural Catastrophes and Man-Made Disasters in 2003*, Swiss Re.

# Direct Economic Losses from Man-Made Disasters



Source: Sigma No. 1/2004, *Natural Catastrophes and Man-Made Disasters in 2003*, Swiss Re.

# Direct Economic Losses from All Catastrophes



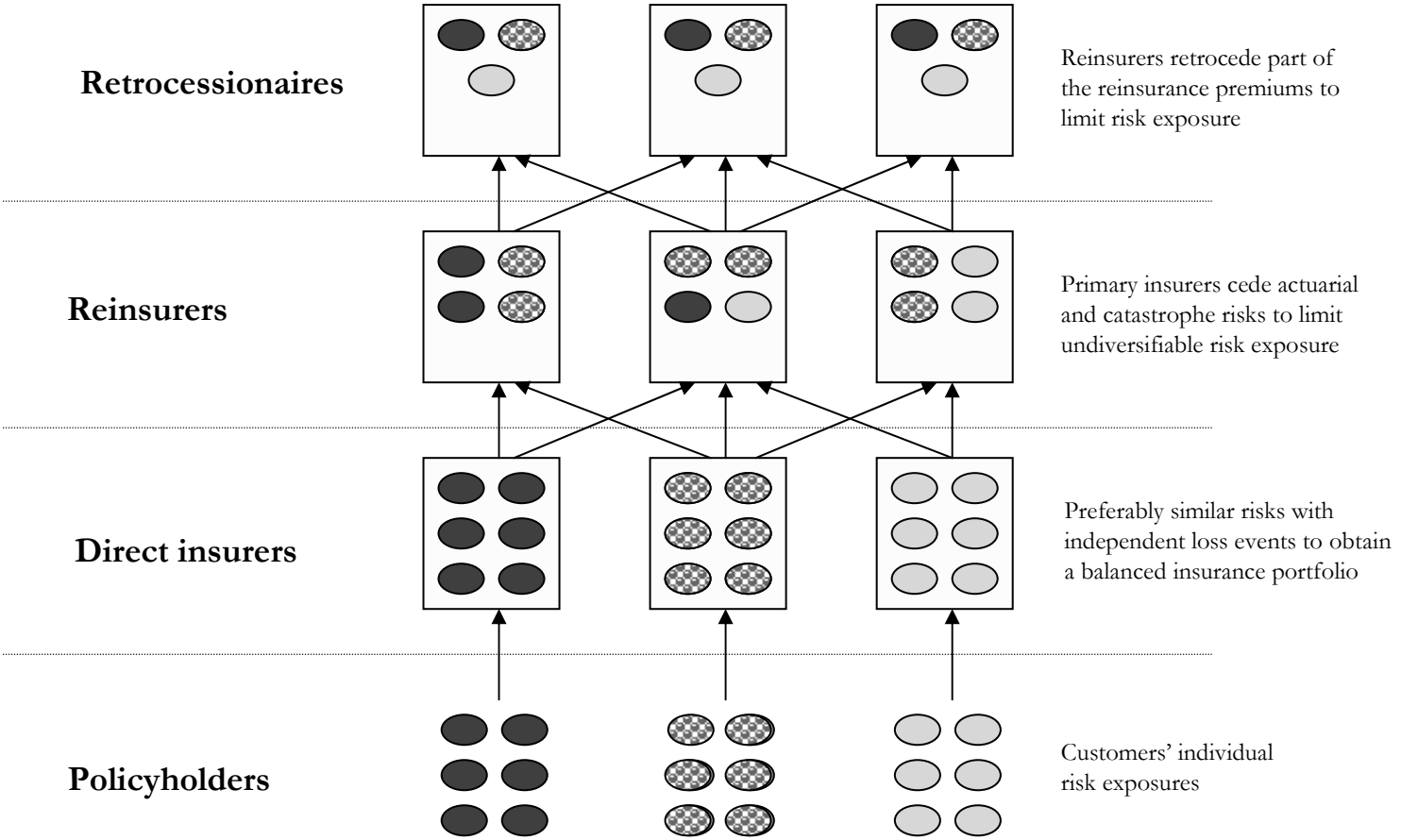
Source: Sigma No. 1/2004, *Natural Catastrophes and Man-Made Disasters in 2003*, Swiss Re.

## The Ten Largest Insured Catastrophe Losses

[US\$ Million]	Victims	Year	Event	Country
20,511	38	1992	Hurricane Andrew	USA, Bahamas
19,301	3,000	2001	Attacks on WTC	USA, Bahamas
16,989	60	1994	Northridge earthquake	USA, Bahamas
7,456	51	1991	Typhoon Mireille	Japan
6,321	95	1990	Winterstorm Daria	France, UK
6,263	80	1999	Winterstorm Lothar	France, Switzerland
6,087	61	1989	Hurricane Hugo	Puerto Rico, USA
4,749	22	1987	Storms and floods	France, UK
4,393	64	1990	Winterstorm Vivian	Western Europe
4,362	26	1999	Typhoon Bart	Japan

Source: Sigma No. 1/2004, *Natural Catastrophes and Man-Made Disasters in 2003*, Swiss Re.

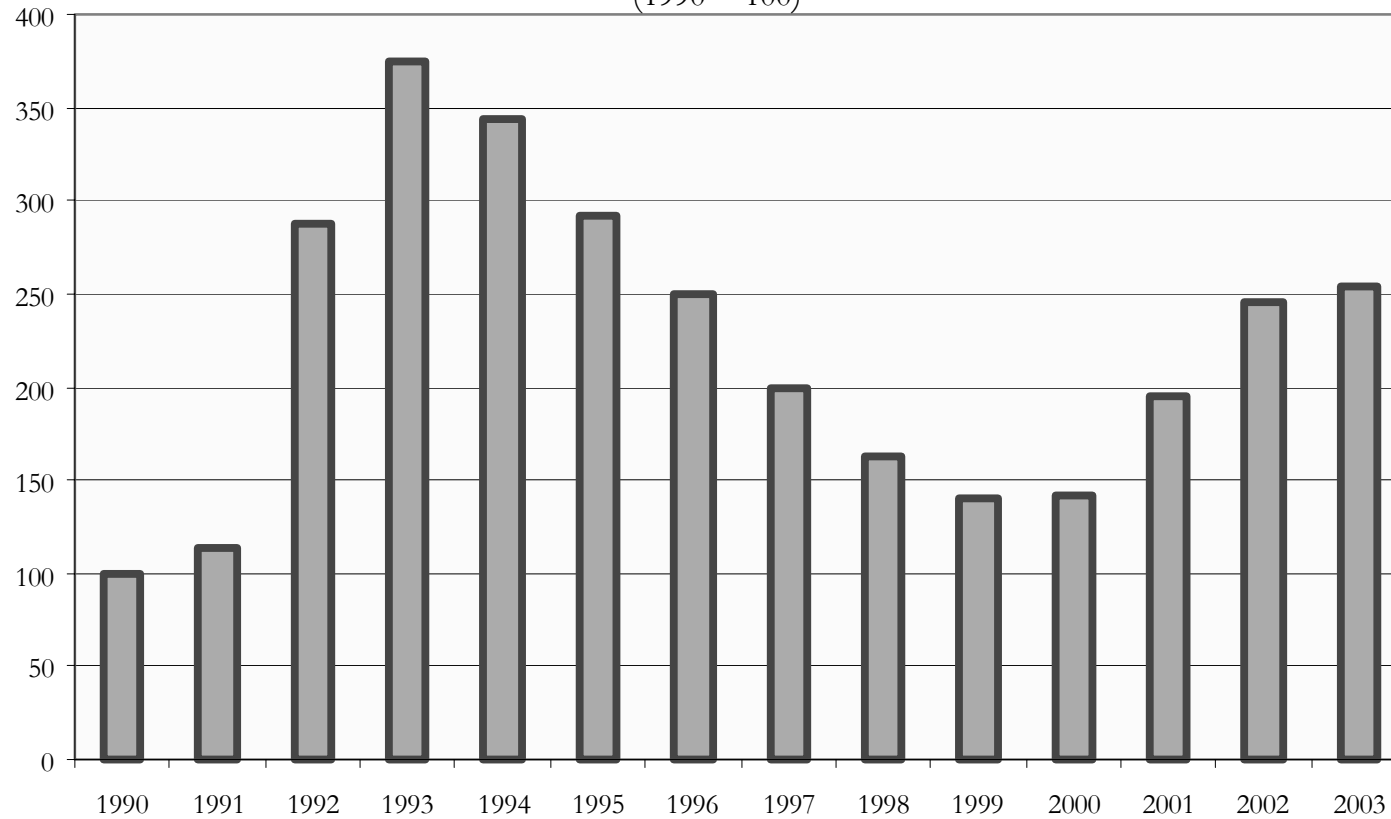
# The Insurance and Reinsurance Markets



# Development in Reinsurance Prices

## World Rate-on-Line

(1990 = 100)

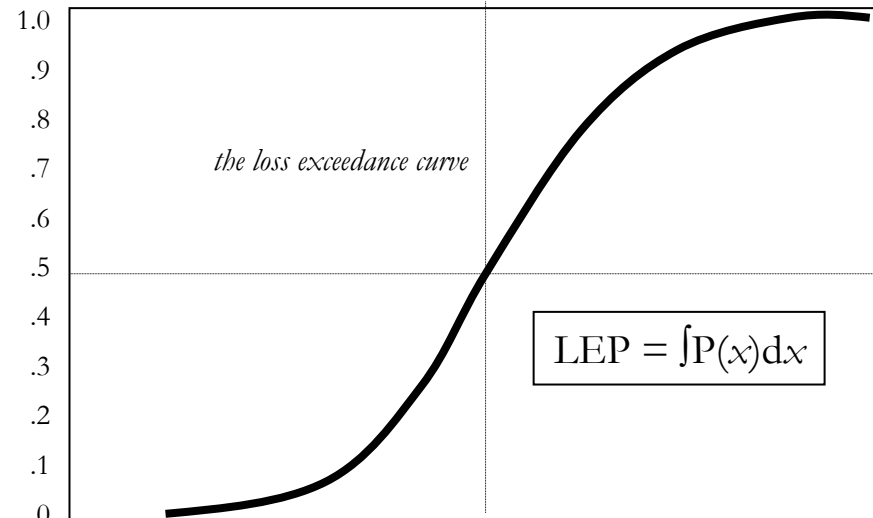


Source: Guy Carpenter, *The World Catastrophe Reinsurance Market*, Sept. 2003.

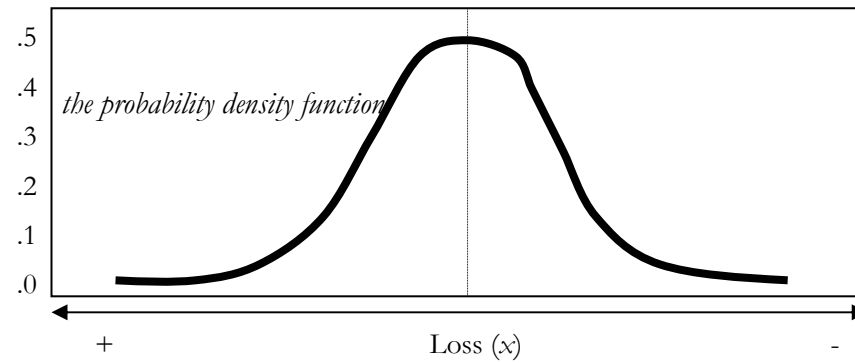
# Catastrophe Loss Probability Curves

## Model Estimates - Probabilities of Catastrophe Losses

LEP (loss exceedance probability)

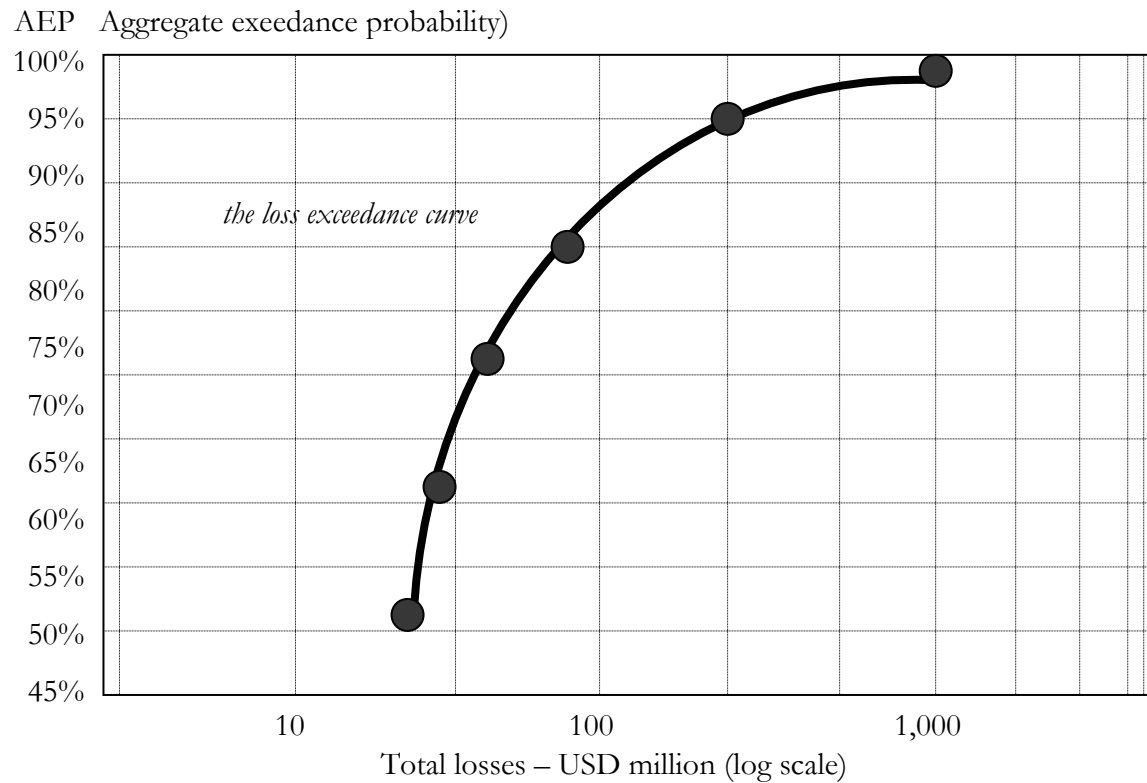


P (probability of loss)



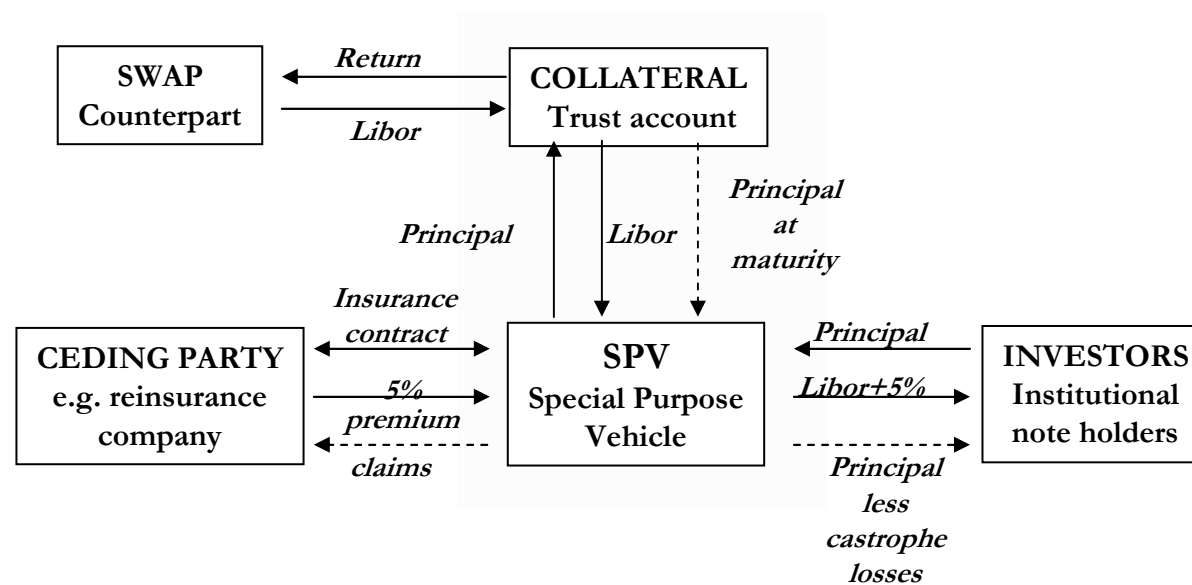
# Catastrophe Loss Probability Curves

**Model Estimates - Probabilities of Catastrophe Losses**  
(Layered Reinsurance Program – Example)

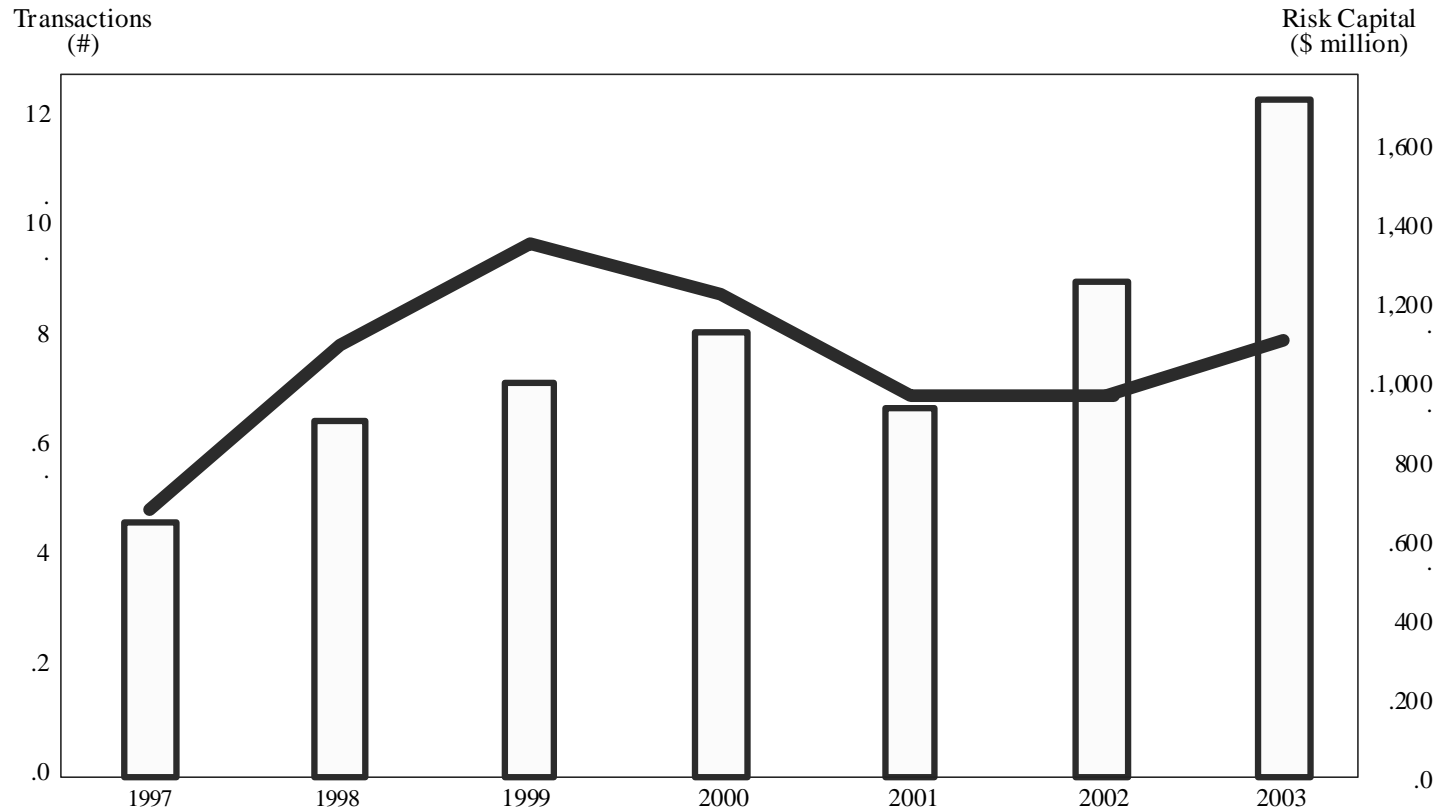


# Structure of Risk-Linked Securities

## Securitization of insurance exposure – catastrophe risk



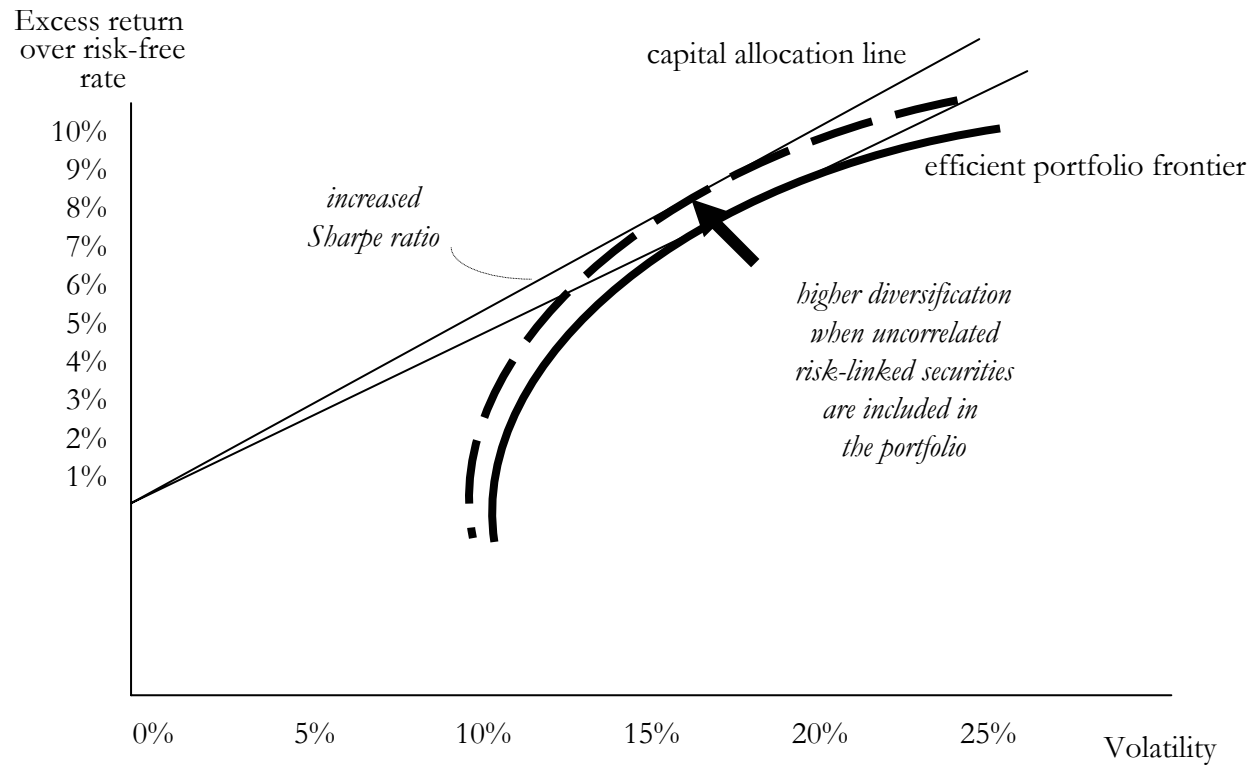
# Issuance of Risk-Linked Securities



Source: MMC Securities, *Market Update: The Catastrophe Bond Market at Year-end 2003*.

# Risk Diversification

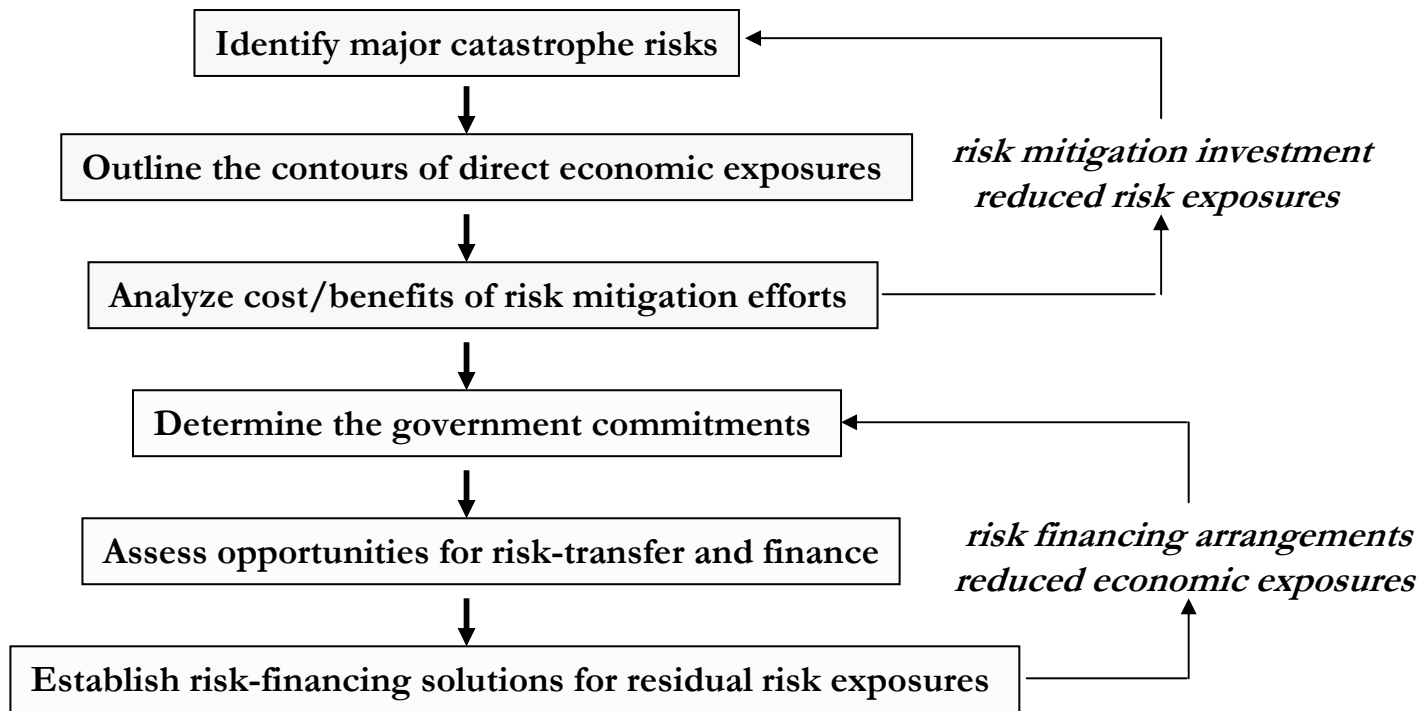
## Incorporating Cat-bonds in the Invested Portfolio



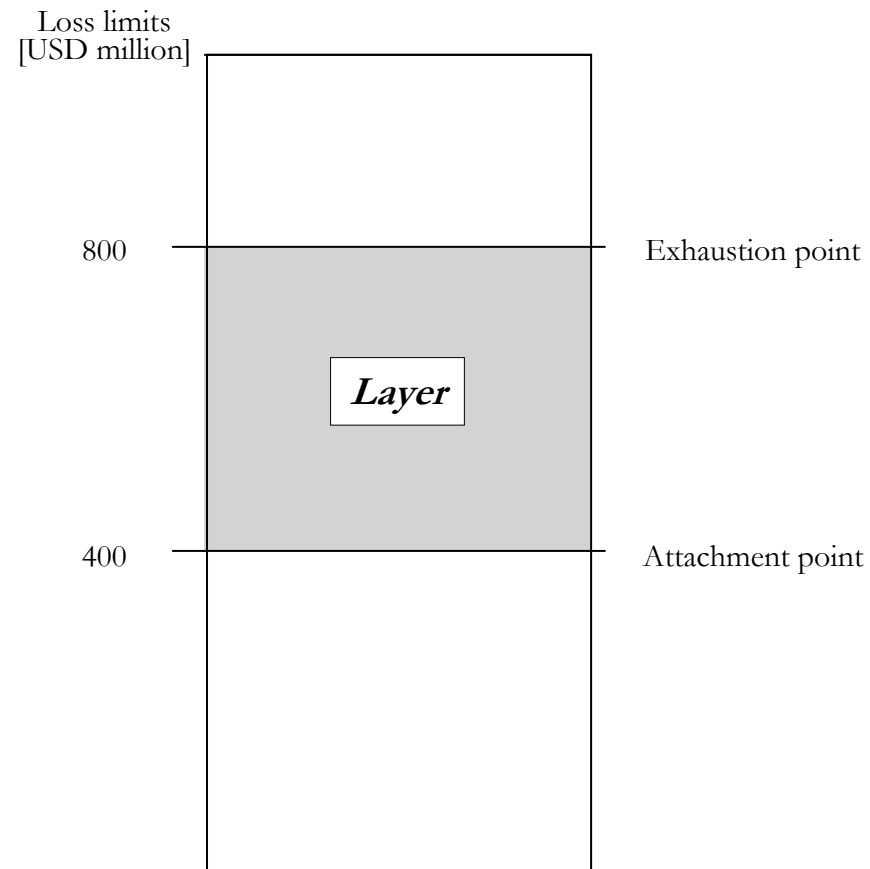
# Comparing Risk-Management Instruments

Instrument	Pros	Cons
Insurance treaties	<i>a well established market risk is transferred – no repayment</i>	<i>reinsurance prices are highly cyclical capacity sensitive to recent loss experiences premium paid up front</i>
Risk-linked securities	<i>large capital market reservoir institutionalized practice risk is transferred – no repayment</i>	<i>finite market size it is extremely hard to model terrorist risk premium paid up front</i>
Contingent capital	<i>additional market segment</i>	<i>premium paid for right to borrow money provides possibility to borrow money</i>
Financial derivatives	<i>large market diverse catastrophe indexes</i>	<i>limited interest and market liquidity exchanges close due to lack of business</i>
Catastrophe swaps	<i>may provide flexible documentation can reduce handling time</i>	<i>constitutes another type of insurance contract needs insurance companies as counterparts</i>

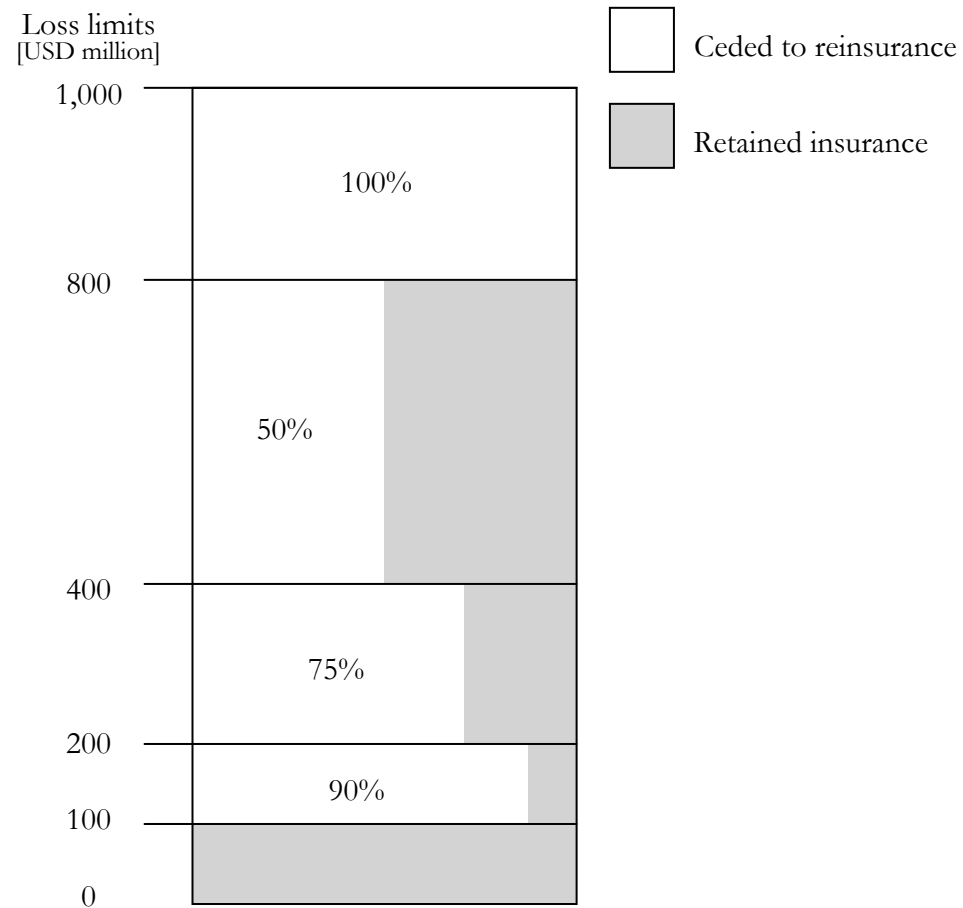
# The Formal Risk Management Process



# Insurance Layer - Example



# Layered Reinsurance Program - Example



# Layered Insurance Pool - Example

