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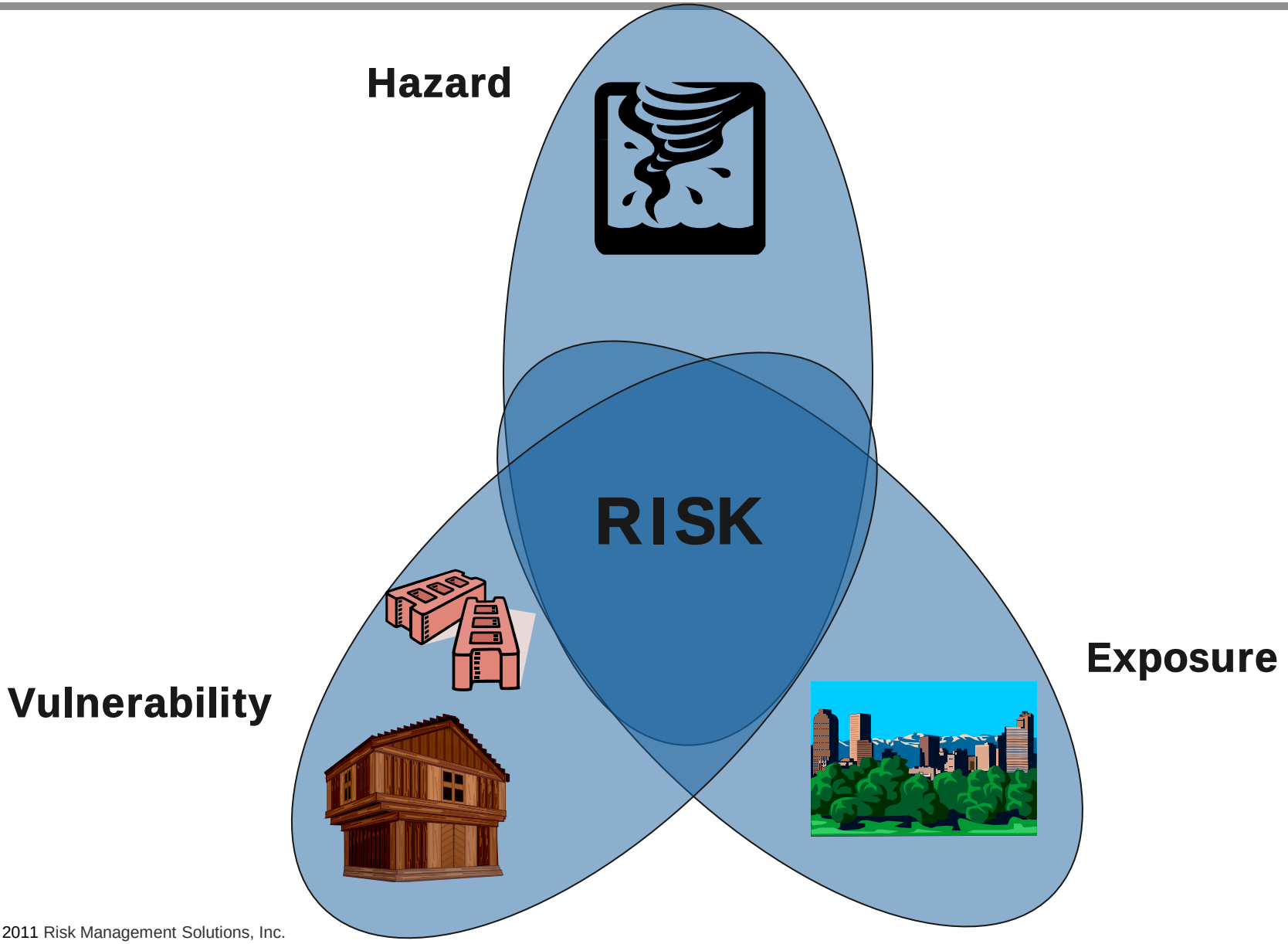
Technology Transforming Decision-making: Managing Natural Hazard Risk

Dr. Patricia Grossi

Research Director

Risk Management Solutions

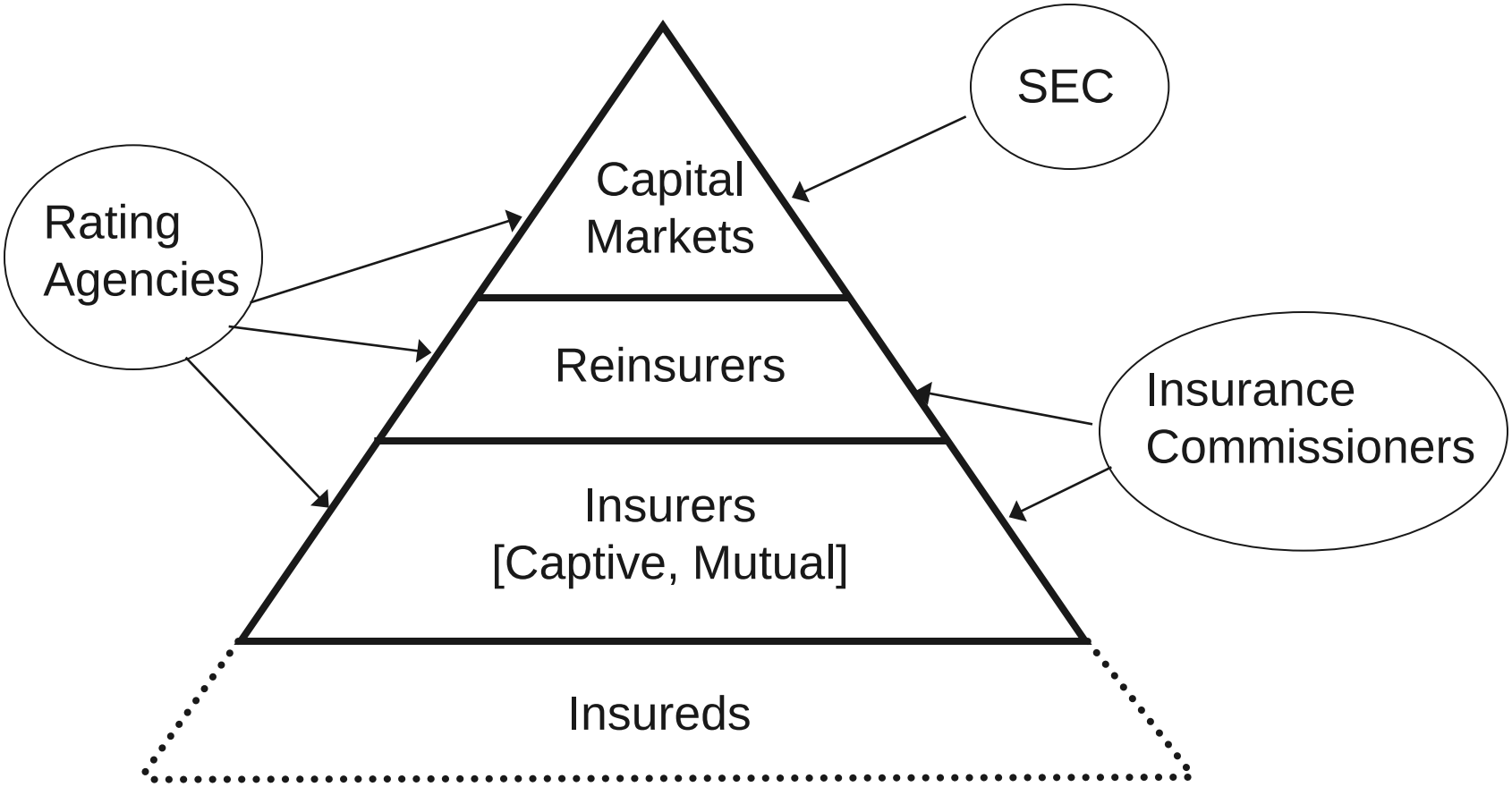
Modeling Natural Disaster Risk



Insurance and Catastrophe Risk

- Insurance is founded on the principle of risk diversification
  - When the magnitude of a potential loss is considered too great to bear, risk is transferred to an insurer (in exchange for a premium) to be pooled with other uncorrelated risks
  - Insurance is discretionary – insurer can choose what to insure and (in unregulated markets) at what price
- Key challenge to the insurance industry is risk correlation = Catastrophe (CAT) Risk
  - Insurers buy insurance from reinsurers to protect themselves against catastrophic (CAT) losses

The Risk Pyramid



CAT models are used within and across each organization of the pyramid

Insurance Regulation in the U.S.

- Solvency regulation: Is an insurer sufficiently capitalized to meet its obligations?
- Rate (or market) regulation: Are insurance rates equitable and nondiscriminatory?
- Regulator plays a vital role in ensuring that a viable insurance market is functioning with coverage offered to consumers at affordable prices
- And catastrophe models play a vital role in calculating solvency requirements (PML) and establishing rates (AAL)
- Therefore, regulator benefits from a strong familiarity with catastrophe modeling and how it can best be used to create a well-regulated and successful insurance system

Catastrophe Modeling and the Regulatory Process

- Catastrophe models present a challenge for regulators
  - Provides a scientifically rational approach for quantifying an insurer's risk … yet…
  - Involves technical expertise outside a regulator's traditional knowledge base
  - Public acceptance of the use of models for rate-making is low (e.g., perceived as a tool for justifying higher rates)

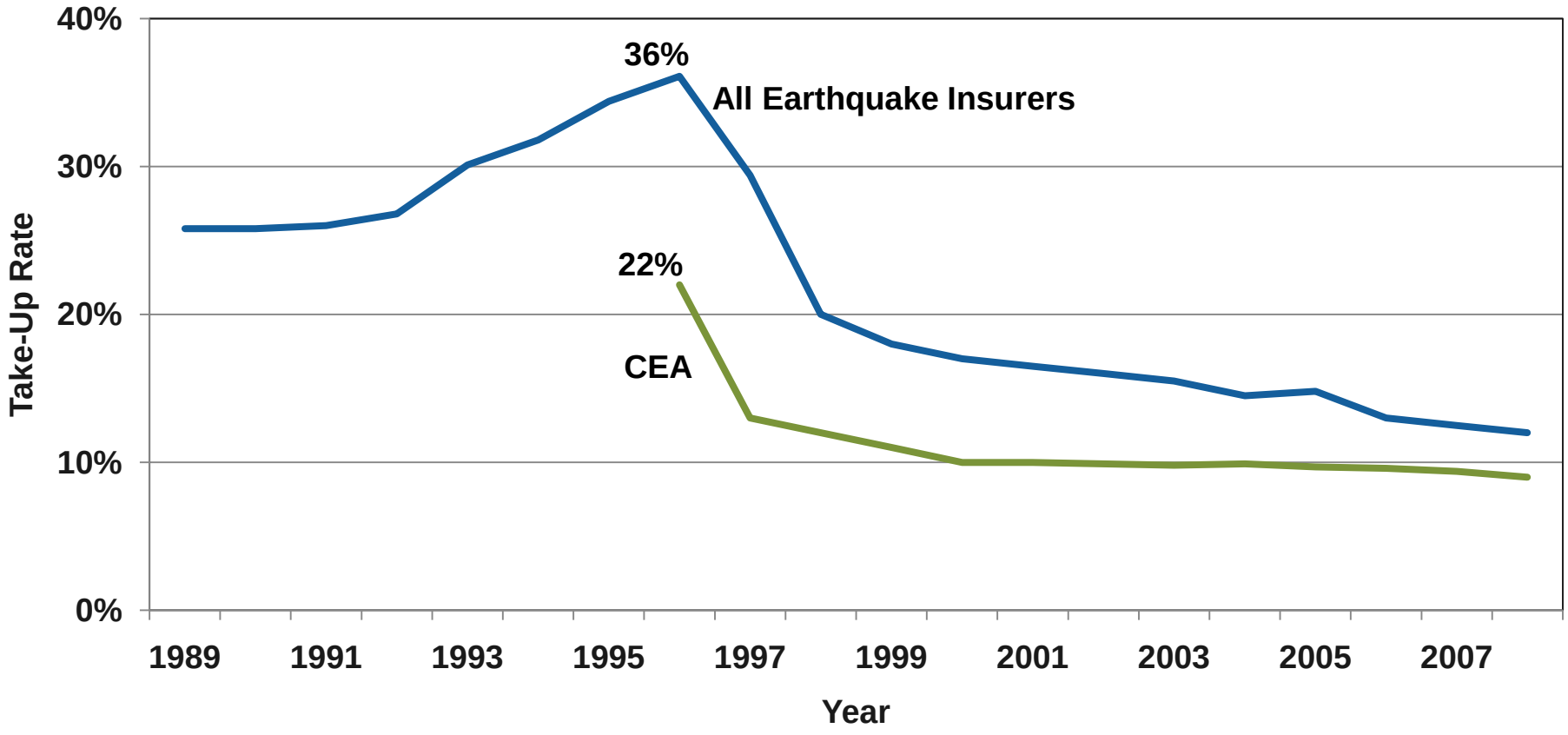
The Case of California Earthquake Risk

- 1985: ‘Mandatory offer law’ compelled insurers who offered homeowners coverage in California to offer earthquake coverage as well
- 1994: Northridge Earthquake losses were 28 times the collected 1993 premium and took 18 months to reach $15 billion
- 1995: Insurance industry unsuccessfully sought repeal of mandatory EQ offer; 95% of residential market virtually stopped writing HO coverage

California Earthquake Authority

- 1996: CEA Established
  - Public instrument of the state
  - Privately financed and publicly managed
  - Homeowners market restored
- 1997: Rate application filed, with rates determined through the use of a catastrophe model (“risk based, using best available scientific information”) – followed by a lengthy public rate hearing with the commissioner ruling in favor of the CEA
- Today: Largest Provider of EQ Insurance in U.S.
  - 770,000 policyholders (70% of California residential EQ market)
  - $9.5 billion claim-paying capacity
  - However….take-up rate is extremely low

California Residential Earthquake Insurance



The Future of the CEA

- CEA's vision:
  - Make CEA products more useful and appealing by developing new policy options
  - Work actively to gain Congressional approval of a federal debt guarantee
  - Promote compelling reasons for more Californians to prepare for financial recovery from earthquake damage
- However, there are barriers to increasing the take-up rates
  - Homeowner's willingness to pay for coverage
  - Accumulation of capital by the CEA (e.g., CEA does not believe, given its current financial structure, that it could acquire enough affordable capital to support a 20% take-up rate.)

Use of Catastrophe Models will only grow...

- Catastrophe modeling has evolved considerably from the days when actuarial methods relying on past loss experience were used for risk assessment and management.
- For the CEA, an analysis of the impacts of insurance take-up rates and insurance coverage options is only achievable through the use of a catastrophe model.
- Catastrophe modeling is now part of the landscape of tools used by the insurance industry for a better understanding and management of risk. Updates to regulations will (most likely) require the use of catastrophe models.

Thank You