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THE ECONOMICS OF CATASTROPHE RISK INSURANCE

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Powerpoint presentation

This document is circulated for Session 1 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.

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The economics of catastrophe risk insurance

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An overview

- Why is insurance essential?
  - risk aversion;
  - diversification;
  - separation of investment and risk-taking.
- Insurability of catastrophic risks.
- What is the social cost of uninsurability?
- What are the possible remedies?

Efficient risk sharing

- All diversifiable risks are eliminated:
  - full insurance and actuarial prices for diversifiable risks;
  - no risk premium for assets with $\beta=0$.
- Comonotonicity of individual consumption levels.
- The macro risk is spread over the largest possible population: reinsurance, financial market participation, taxpayers,...

Stylized facts

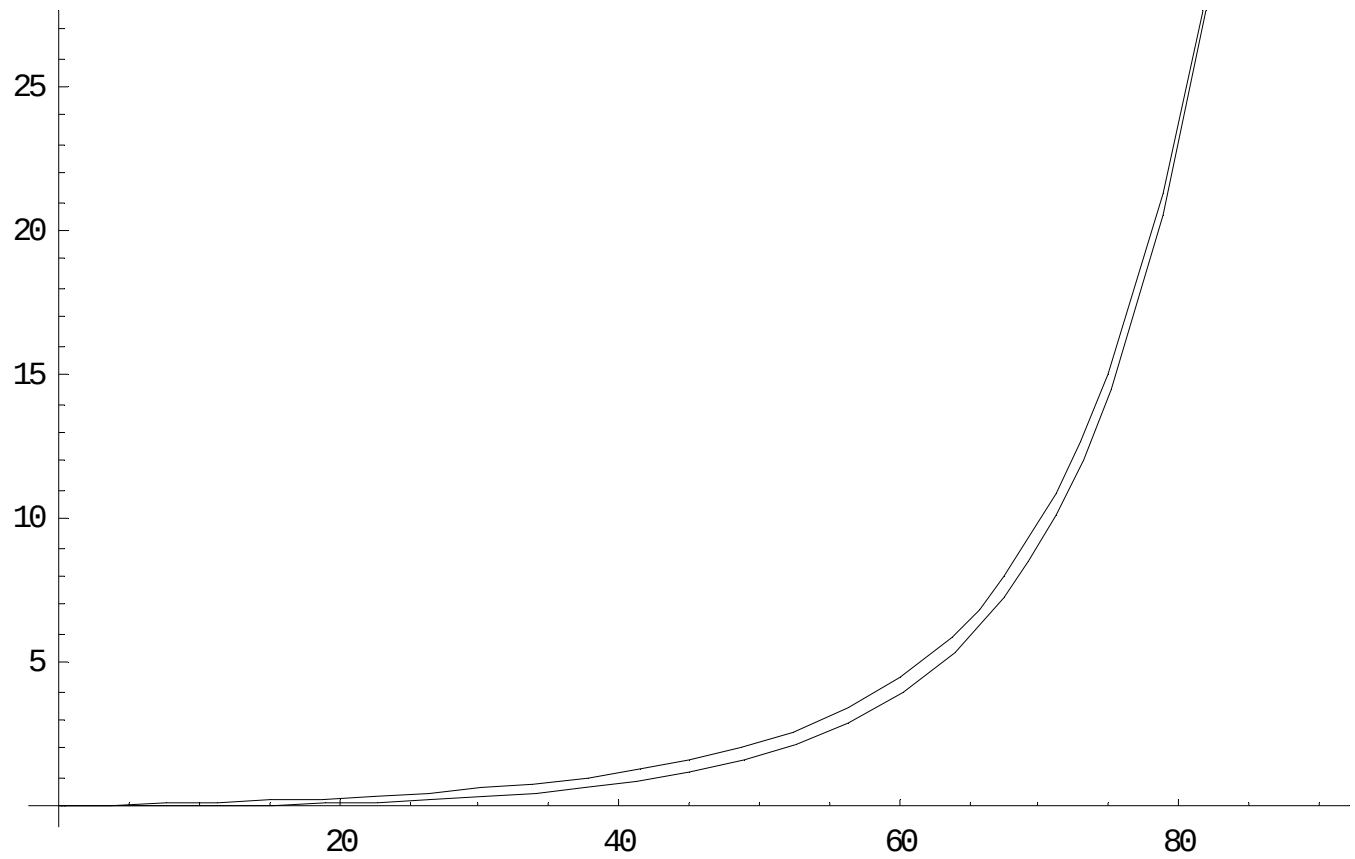
- Market insurance supply for catastrophe risks is limited when available.
- Many risk-bearers prefer no to purchase these coverages.
- Volatile prices and market capacity.

The social cost of uninsurability

- Consider a risk-averse agent who bears the risk to lose k% of her income with a probability of 1% every year.
- Her relative risk aversion is 4.
- She cannot time-diversify.
- What share of her yearly income would she be ready to pay to eliminate this risk?

The social cost of uninsurability

Social cost
(% of yearly income)



Loss (% of yearly income)

Potential explanations for the insurability problem

- Large risk premium for catastrophe risks.
- Costs linked to the timing of indemnification.
- Unequal exposures in the population.
- Crowding out by solidarity.
- Absence of objective probabilities.
- Difficulties to "time-diversify" the risk, given solvency problems.

Large risk premium

- Catastrophe risks cannot be diversified in individual portfolios.
- Shareholders will accept to provide insurance only at a premium.
- The insurance pricing will induce agents to efficiently retain some of the risk.
- There is no reason for public intervention.
- International diversification puzzle.

Transaction costs

- Waves of claims from policyholders.
- This yields some difficulties:
  - Increased cost to audit claims;
  - Increased risk of fraud.
- Limiting insurance supply and raising prices are an optimal reaction to these problems.
- Develop standardized insurance products
  - with lump-sum indemnities;
  - where indemnities are indexed on the aggregate loss in the community.

Unequal exposures to risk

- The risk can be highly concentrated on some agents.
- "Wealth" redistribution.
- Competitive prices will discriminate against these agents.
- Insolvent insurance demand.
- Policy:
  - compulsory insurance + flat premium rate;
  - Special tax programs (ex-ante or ex-post).
- Moral hazard? Inverted wealth redistribution?

Crowding out by solidarity

- Multiple rational expectation equilibria.
- If most people remain uninsured, solidarity mechanisms will have to be implemented ex-post. This justifies remaining uninsured ex-ante!
- Inefficient implicit solidarity mechanism.
- Policy recommendations:
  - Political commitment by delegation (ins fund).
  - Compulsory insurance.

Absence of objective probabilities

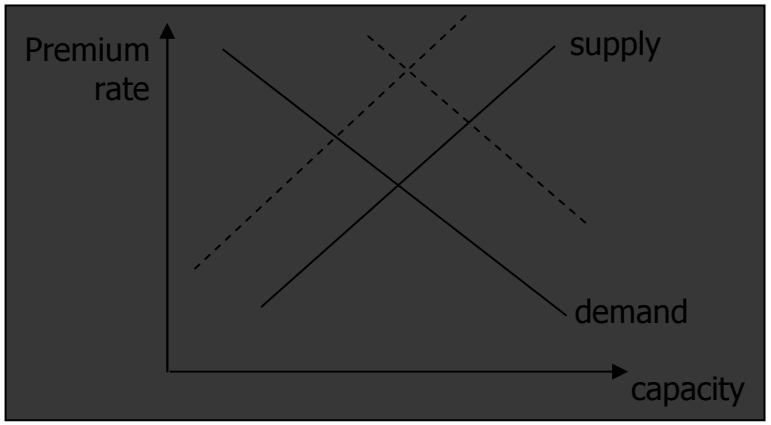
- Terrorism, climate change: Risk on risk.
- How do insurers react to ambiguous probabilities?
- There is a probability p to incur damage L.
  - Risk 1: p=0.2 % with certainty.
  - Risk 2: p can be either 0.1% or 0.3% with equal probabilities.
- Savage (1954)
- Ellsberg (1961), Gilboa and Schmeidler (1989): for a given premium, one prefer to insure 1.
- Insurers are “ambiguity-averse”.

Insurers' ambiguity aversion

- Two risks:
  - Risk 1: p=0.2 % with certainty;
  - Risk 2: p can be either 0.1% or 0.3% with equal probabilities.
- Cabantous (2003): questionnaire to french actuaries:
  - Mean premium for risk 1 = 1.35 x AV;
  - Mean premium for risk 2 = 1.78 x AV.

Absence of objective probabilities

- Ambiguity aversion, biases toward pessimism: reduces supply, but increases demand!



- Would insurers be systematically more pessimistic? Adverse selection?

The curse of error-I for underwriters

- Two types of error:
  - to accept a risk that is undesirable (I);
  - to reject a risk that is desirable (II);
- One punishes error-I heavily, but not error-II.
- Implies a bias towards too much precaution.
- Efficient reward system: keep track of each individual expert's recommendation.

Inability to "time-diversify"

- Financial reserves in the insurance sector serve as a "buffer stock" to smooth shocks on aggregate wealth over time.
- Time diversification: allows for increasing the capacity of the market.
- Limited by the solvency issue.
- Policy recommendations:
  - Improve tax advantages for technical reserves.
  - Contingency plan to ease access to credit market in case of insurance crisis.

Contingent subsidized loan programs

- Time diversification argument applied to consumers in case of a severe insurability problem.
- Liquidity constrained consumers are not able to smooth their losses over time after a catastrophe.

Conclusion

- Potentially high social cost of uninsurability.
- Many possible causes and remediations.
- Policy recommendations:
  - Indemnity indexed on aggregate loss.
  - Compulsory insurance + flat rate?
  - Political commitment on a solidarity scheme.
  - Reinforce incentive to reduce errors of type II.
  - Contingent subsidized loan program to the insurance sector and to victims.