Cat bonds and reinsurance:
The competitive effect of information-insensitive triggers

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Motivation

- Catastrophe (cat) bonds have evolved as an alternative to reinsurance to hedge (re-)insurers’ risk from catastrophic events
- “Alternative Risk Transfer” products with parametric or index triggers
- Cat bonds with parametric or index triggers were interpreted as an important innovation
- However, its use (still) lags behind the perceived importance

1. Can there be benefits of the availability of cat bonds (with parametric or index triggers) even when they are not used?
2. Do we need cat bonds or can reinsurers issue contracts with parametric or index triggers?
Introduction

- Froot (JF, 2001): Cat bonds reduce barriers to entry and increase the contestability of the reinsurance market
- Potential source of reinsurers' market power:
  - Capital market frictions → capacity constraints
  - Asymmetric information between reinsurers → adverse selection

Adverse selection in reinsurance markets
- Incumbents have better information about an insurer's expected loss
- Entrants are reluctant to bid aggressively because they fear to attract only high-risk insurers
- The incumbent earns a rent because of adverse selection
Our Contribution

• Benefit of reinsurance with a parametric trigger:
  – Insensitive to the risk of an insurer's portfolio
  – Reduce the cost of entry as this contract is not subject to adverse selection
• Competition in reinsurance market increases when
  – products with parametric triggers are available
  – basis risk is not too high
• The basis risk places an upper bound on the rent that the incumbent can extract
• A parametric trigger is not used in equilibrium
Setting (1)

- Insurers want to hedge a potential loss from a catastrophic event
- Two types of insurers, high risk and low risk
  - High risk: high expected loss
  - Low risk: low expected loss
- Two types of contracts:
  - Full reinsurance with indemnity trigger $\rightarrow$ zero basis risk
  - Cat bond with parametric trigger $\rightarrow$ basis risk
Two types of reinsurers:

- **Current reinsurer → incumbent or "insider"**
  - knows the insurer's type
  - offers reinsurance at a premium that depends on the insurer's type

- **New reinsurers → entrants or "outsiders"**
  - know the expected type
  - offer reinsurance at a premium that is independent of the insurer's type
Equilibrium without cat bonds

Strategic interaction
• Insider and outsider choose their premiums
• The insurer chooses the contract with the lowest premium
• Outsiders are not willing to bid aggressively as they fear adverse selection
• Insider is able to extract a rent from a low risk insurer
• Outsider is expected to break even
  – Loss from high-risk insurer and profit from low-risk insurer
  – Cross-subsidization of types

➢ Difference between expected premiums of high-risk and low-risk insurer decreases in insider's rent and level of cross-subsidization
Equilibrium with cat bonds

- A cat bond with a parametric trigger is an alternative to an indemnity contract.
- Demand depends on:
  - premium loading (= premium – expected loss)
  - basis risk
- The cat bond is not subject to adverse selection and constrains the premium that the insider can demand.
- The insider can make an offer that is more attractive than the cat bond for the insurer (because of basis risk).
- Thus, the cat bond will not be chosen in equilibrium.
Implications (1)

• The introduction of cat bonds increases the difference in premiums for high risk and low risk insurers
• The heterogeneity in profitability and growth between insurers increases
• The magnitude of the effect depends on the level of basis risk and the degree of asymmetric information
• The responsiveness of reinsurance contracts to the insurer's risk is more pronounced as asymmetric information increases and basis risk decreases
Implications (2)

• Asymmetric information is higher for
  – insurers that are incorporated in countries where accounting information is less informative about an insurer's risk
  – mutual insurers that are more opaque than stock insurers
• Basis risk is lower for insurers that have a high concentration of exposure in regions with high risk of catastrophic events
  – Californian and Japanese earthquakes
  – East coast hurricanes and Japanese typhoons
Using cat bonds?

Reasons for using cat bonds:
• Monitoring cost and differential transaction cost
• Moral hazard
• Counterparty risk

But why are cat bonds needed?
• Reinsurer can offer contracts with an exogenous trigger
• Protected cell within reinsurer to reduce counterparty risk

➢ Complementary design elements of cat bonds
Cat bonds and reinsurance

- Catastrophe (cat) bonds have evolved as an alternative to reinsurance to hedge (re-)insurers’ risk from catastrophic events
- Instead of directly issuing the cat bond, an insurer typically uses a special purpose vehicle (SPV), which is set up for this transaction
- The insurer writes a reinsurance contract with the SPV, which backs the transaction by raising capital through issuing bonds
- In the case of a catastrophic event the interest or the principal are reduced or forgiven and a payment is made from the SPV to the insurer
- The level of insurance payment or, equivalently, debt forgiveness, usually depends on a composite index of insurers’ losses or a parametric measure of the event
Cat bond structure

- The SPV can be interpreted as a focused insurer whose only purpose it is to write one insurance contract
- In contrast, a general insurer engages in many different activities and has many different risks on its balance sheet
Problems in risk transfer – issues to consider

- Taxes, loading, and regulation
- **Information risk**: the insurer may be better informed about potential losses, activities to reduce potential losses, and the realized loss
- **Moral-hazard risk**: the insurer may be able to control the risk and protection may affect the level of risk control (increase risk)
- **Performance risk**:  
  - **Acceptance risk**: the protection seller may hackle and try to reduce or delay the required payment  
  - **Counterparty risk**: the protection seller may be unable to pay
- **Basis risk**: risk from a mismatch between cash flow from the protection instrument and the loss to be hedged
Design of risk transfer instruments

Design elements to deal with problems of risk transfer:

- **Trigger:** indemnity payment
  - exogenous trigger

- **Organizational structure:** intermediary (reinsurer)
  - direct (SPV)

- **Funding:** unfunded (multiple risks)
  - funded (collateralized)

- **Contractual structure:** retaining and bundling risks
Benefits & costs of cat bonds

+ An index or parametric trigger reduces information, moral-hazard, and acceptance risk
+ The SPV is a pure play and the risk that its funds are diverted to other uses is minimized
+ This can considerably reduce the cost of raising and holding capital and increases the confidence of the insurer that the funds will be available when needed
+ A sufficiently high endowment of the SPV eliminates the counterparty risk
- The basis risk can be high if the correlation between the trigger and the insurer’s loss is low
- No suitable index or parametric trigger may be available
Design issues (1)

*Why doesn't the reinsurer offer a contract with an exogenous trigger?*

- A reinsurer has high (frictional) cost of raising and holding funds
- The reinsurer has no comparative advantage to bear the risk associated with an exogenous event → no value is added through monitoring, a long-term relation, and reputation
- Of course, one could choose an arrangement where new funds are put in a special account to cover the losses of one particular risk and on which the reinsurer has no recourse (and which has no recourse on the reinsurer)
- This is what is implemented through the SPV “SPV as reinsurer’s subsidiary”
Design issues (2)

Why doesn’t the insurer issue the cat bond directly?

• The debt holders’ claim would be exposed to the insurer’s credit risk and debt holders would have to evaluate the exposure
• The debt may change the insurer’s incentives
• The question arises how the funds are used
• Of course, one could choose an arrangement where the funds are put in a special account that serves as collateral for the debt and the insurer is only allowed to use the funds in a catastrophic event according to the cat bond’s trigger
• But this is exactly what is implemented through the SPV
Why isn’t an indemnity payment used?

- With an indemnity payment, monitoring would be required
- A reinsurer would be in a better position to carry out the monitoring
  - The reinsurer’s reputation helps to overcome problems associated with an indemnity payment
  - Diversification reduces the costs of providing incentives to monitor
Indemnity Trigger
+ No basis risk
- Information, moral-hazard, & acceptance risk

Intermediated
+ Monitoring and screening
+ Reputation
- “Who monitors the monitor?”
- Frictional cost of capital

Diversification
+ Reduce costs of monitoring
+ Reduce frictional cost of capital
- Counterparty risk

Indemnity insurance requires a diversified intermediary
Cat Bonds

Cat bonds

Exogenous Trigger
+ Low information, moral-hazard, & acceptance risk
- Basis risk

SPV
Focused insurer (one policy)
+ Low frictional cost of capital

Collateralized (Funded)
+ No counterparty risk

With an exogenous trigger, a SPV has a comparative advantage