Use of Financial Markets as a Supplement to Insurance for Financial Management of Extreme Disasters

On behalf of
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by
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Agenda

- Japan earthquake insurance/reinsurance and its use of financial markets
- State of private risk markets and uses of financial instruments
- Change in mega disaster risk landscape and roles of private markets and public policy
Part 1

Japan earthquake insurance/reinsurance and its use of capital markets
Natural catastrophe pools

![Diagram showing various natural catastrophe pools around the world, including:
- JP/JER USD $42bil
- TW USD $1.5bil
- US/CEA USD $7.7bil
- US FHCF USD $45bil
- GCIF (*)
- CCRIF (*)

Legend:
- Capped limit
- Unlimited Cap

(*) Facility of the World Bank]
Japan earthquake insurance

- Established 1966 after 1964 Niigata Earthquake with a government sponsored reinsurance program
Japan earthquake insurance

- Established 1966 to facilitate financial protection of homeowners against earthquake risks

- Non-compulsory

- EQ insurance can be purchased in addition to fire policy with a 30% to 50% prorated amount
  - Limit has US$416K* for structure, US$83K* for contents
    *US$=120yen

- Subscription rates at >20% nationwide

- Cooperative EQ insurance operates separately in the domestic market (with more rural focus)
Pricing of Japan earthquake insurance

Rating Table
Unit: Per 1000yen
Discount available by:
- Built year (after June 1981) or
- Building Performance grades (1-3)

<table>
<thead>
<tr>
<th>Grade</th>
<th>Wooden</th>
<th>Non-Wooden</th>
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</thead>
<tbody>
<tr>
<td>1st</td>
<td>1.20</td>
<td>0.50</td>
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<tr>
<td>2nd</td>
<td>1.65</td>
<td>0.70</td>
</tr>
<tr>
<td>3rd</td>
<td>2.35</td>
<td>1.35</td>
</tr>
<tr>
<td>4th</td>
<td>3.55</td>
<td>1.75</td>
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</table>
Risk transfer process

Household (Policyholder of EQ Insurance)

Non Life Insurer

Reinsured

Japan Earthquake Reinsurance (JER)

JER: Retention

Japanese Government (EQI Special Account)

Non Life Insurer

9.0% + 82.5% + 8.5% = 100% of total limit
Reinsurance layers (for 2007)

- Japanese Government: 95%
- JER: 50%
- Primary Insurers: 50%

- US $41.7bil (¥5trillion)
- 26.3bil
- 10.9bil
- 6.2bil
- US $0.6bil

http://www.nihonjishin.co.jp/
Use of financial instruments at JER

• As a government sponsored reinsurance, JER has been insulated from the volatility of private reinsurance market in the last 40 years.

• In light of ever-increasing potential EQ event losses and fiscal constraints of Japanese government, JER started to examine the benefits of using private markets.

• For a starter, JER took an integrated balance sheet approach and began purchasing asset liquidity/price protection against mega earthquakes.

• JER will further study and seek its optimal use of private markets among various parameters and ongoing improvements of EQ insurance.
“Cat” put investment option

• Purpose
  – To ensure JGB that JER holds can be sold at par within 20 days of a major trigger event (“JGB cat put option”)
  – To ensure such JGB can be also sold by canceling the option

• Plan
  – JER will purchase more cat put options in order to increase price-protected asset liquidity upon EQ events over time

Trigger event:
An earthquake of having an epicenter equal to or more than JMA M6.9 within 100 km deep from the surface in the zone.
Part 2

State of private risk markets
and uses of financial instruments
Flow of worldwide P&C risk transfer

Household / Individual Insurance
$700Bil

Corporate / Industrial
$500Bil

Primary Insurance
$1200Bil

Reinsurance
$135Bil

Capital Markets
$9Bil

Retrocession
$15Bil

Life Capital Markets
$15Bil

Source: Group Thirty Report, Swiss Re
Pricing volatility and market dynamics

Reaction:
- Endure lower profitability until shareholders’ demand prevails
- Industry consolidation to achieve growth

- Quiet loss seasons
- Softening prices
- Excess supply

- Surprise insured Losses (e.g. Katrina)
- Hardening prices
- Failure of insurers/reinsurers

Reaction:
- New capital to form new insurers/reinsurers
- Alternative financial solutions
World catastrophe price index

- Bermuda Class of ’93 (3)
- Bermuda Class of ’01 (8)
- Bermuda Class of ’05 (9)
- Andrew $22bil
- World Trade Center $21bil
- Katrina $45bil

Securitization of catastrophe risks

Source: Guy & Carpenter, Insurance Information Institute

http://www.nihonjishin.co.jp/
Evolvement of insurance securitization

Insurance Linked Security  Swaps and Derivative  Industry Loss Warranty  Side Car  Structured Deal

Non-Life Natural Catastrophes  Post - Katrina

Life EV, XXX/AXXX, Ext. Mortality

Pandemic Risks
Development of investor base

Insurance Linked Security → Swaps and Derivative → Industry Loss Warranty → Side Car → Structured Deal

Non-Life Natural Catastrophes → Post - Katrina

Early Profile of Investors

<table>
<thead>
<tr>
<th>Category</th>
<th>Percentage</th>
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<tr>
<td>Insurer</td>
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<tr>
<td>Reinsurer</td>
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<tr>
<td>Money Manager</td>
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<tr>
<td>Hedge Funds</td>
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<tr>
<td>All Others</td>
<td>10%</td>
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<tr>
<td><strong>Total</strong></td>
<td><strong>100%</strong></td>
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Current Profile of Investors

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<tr>
<th>Category</th>
<th>Percentage</th>
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</thead>
<tbody>
<tr>
<td>Hedge Funds</td>
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<tr>
<td>Dedicated Cat Funds</td>
<td>28%</td>
</tr>
<tr>
<td>Money Managers</td>
<td>29%</td>
</tr>
<tr>
<td>Reinsurer</td>
<td>6%</td>
</tr>
<tr>
<td>Insurer</td>
<td>2%</td>
</tr>
<tr>
<td>All Others</td>
<td>4%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>100%</strong></td>
</tr>
</tbody>
</table>

Source: Swiss Re

http://www.nihonjishin.co.jp/
Insurance linked securities

Insurance Linked Security → Swaps and Derivative → Industry Loss Warranty → Side Car → Structured Deal

Investments

Insurer/Reinsurer → SPV → Investors

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Swaps and derivatives

Insurance Linked Security → Swaps and Derivative → Industry Loss Warranty → Side Car → Structured Deal

Investments

Insurer/Reinsurer

SPV

Investors
Industry loss warranty

- Used to be traditional reinsurance form
- Now used either traditional or swap/derivative form
- Define trigger (e.g. $10bil California EQ Industry Loss) and receive fixed amount (e.g. $20mil) once an event hits the trigger during the defined risk period (e.g. 12months)
Side cars

- Emerged after Katrina as a collateralized quota share in a securitized form
- Reinsurer who wishes to obtain additional capital in a limited length of time ONLY (e.g. 3 years), in order to be able to reduce the capacity later

Pre–event R/I Balance Sheet

Post–event R/I Balance Sheet

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Side cars (continued)

- Emerged after Katrina as a collateralized quota share in a securitized form
- Reinsurer who wishes to obtain additional capital during a window period ONLY (e.g. 3 years), in order to reduce the capacity in a soft pricing cycle
Contingent capital to spread loss over time

Positive cash flow to Insured upon pre-defined event

Pre-event period
Purchasing contingent capital by fee

Post-event period
Paying back

Year 1  Year 2  Year 3  Year 4  Year 5  ...  Year X
Part 3

Change in mega disaster risk landscape and roles of private markets and public policy
Natural catastrophe: global economic and insured Losses

Source: Munich Re

http://www.nihonjishin.co.jp/
Natural disasters as fraction of global threats

Risk based regulation pushed banks to accelerate securitization.

- Operational Risks and Internal Control
- Market Risk Regulation added
- First Basel Accord on Credit Risk
Pricing of securitized insurance risks (as of Dec 2006)

Securitized price costs five times underlying loss cost (or expected loss). For example, an insurer needs to pay $5mil in order to purchase a $100mil cover for a risk of once in 100 years; i.e. a loss cost of $1mil.

Source: Author Estimates
Securitized insurance risks have credit spread structure catching up traditional securities

Source: Author Estimates, BIS Research Paper

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Closing remarks

- Need to spread ever-rising disaster risks on a global scale while public resources face more constraints

- Developing and promoting effective risk pooling/transfer mechanisms with a sound linkage of risk mitigation strategy

- Rationalizing price of risk transfer while allocating risk based costs among participants

- Internationally harmonized process to expand a horizon of risk transfer both in public and private sectors