



17TH EAST ASIAN ACTUARIAL CONFERENCE

15 -18 October 2013
Resorts World Sentosa, Singapore

Lessons learned from the Crop Insurance Program in Korea



About Samsung Fire & Marine (SFM)

- Largest P&C Insurance Company in Korea
 - Founded in 1952
 - \$15.2 B in Premium & \$41.8 B in Assets (as of FY 2012)
 - 27% M/S
 - 5,300 employees & over 25,000 exclusive agents
- Carries prestigious AMBEST Rating AA+, S&P Rating AA-
- Writes both primary and reinsurance (ceded and assumed) in Korea and overseas
- HQ's in Seoul, Korea, w/ 21 subsidiaries/branch offices around the world





CONTENTS

- Introduction of Korean Crop Insurance
- 1st Crisis & Lessons & 1st Reform
- 2nd Crisis & Lessons & 2nd Reform



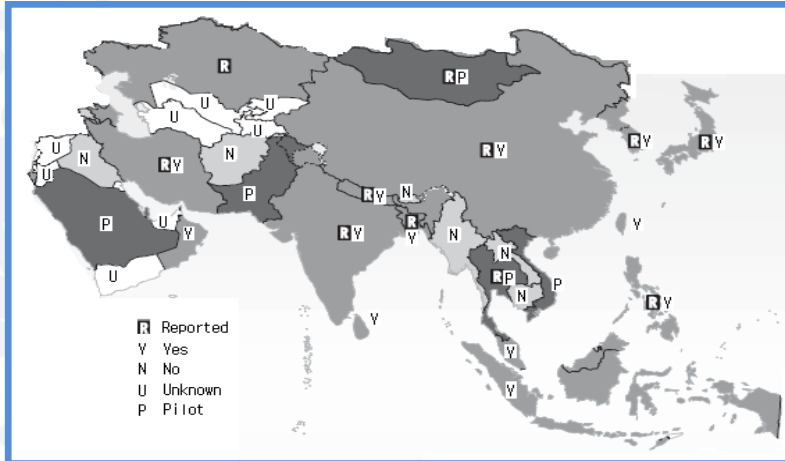
Introduction of Korean Crop Insurance





Overview of Asia Programs

Asia Agricultural Insurance Premium : 2009 3.8 billion USD(19.5%) → 2011 5.6 billion USD(23%)



※ Crop Insurance (Mil USD)

Country	2007	2011
China	681	1,730
Japan	315	356
India	132	390
S.Korea	56	110

Source : World Bank (2010)
Government support to Agricultural Insurance



Korean Crop Insurance Program

□ Launched in 2001

- Crop : 2 Crops(2001, Apples & Pears) → 40 Crops(2013)
- Risk Premium : 3 million USD(2001) → 215 million USD(2013)
- Primary Insurer : Nonghyup P&C Insurance Company
- Secondary Reinsurers : 6 Major Local (re)Insurance Companies
(*Samsung, Hyundai, Dongbu, LIG, Meritz, Korean-Re)





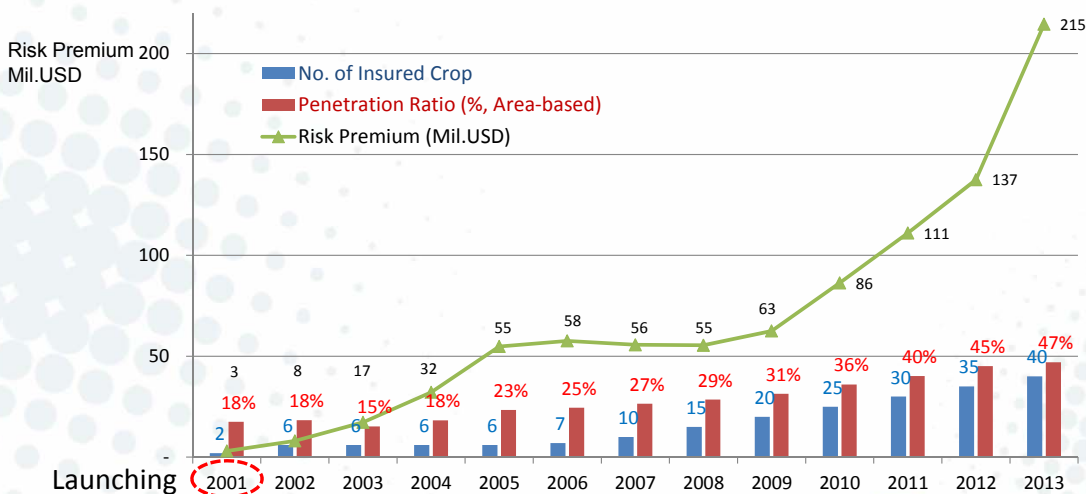
Korean Crop Insurance Program

Public Private Partnership (PPP)

- Government Subsidy : 50% risk premium, 100% A&O expenses
- Government Reinsurance (Stop Loss)
 - 180%(2005~2012) → 150%(2013)
- Two-Step Claims Handling Process (Since 2005)
 - 1st claim review : farmers, 2nd : Nonghyup's claim handlers

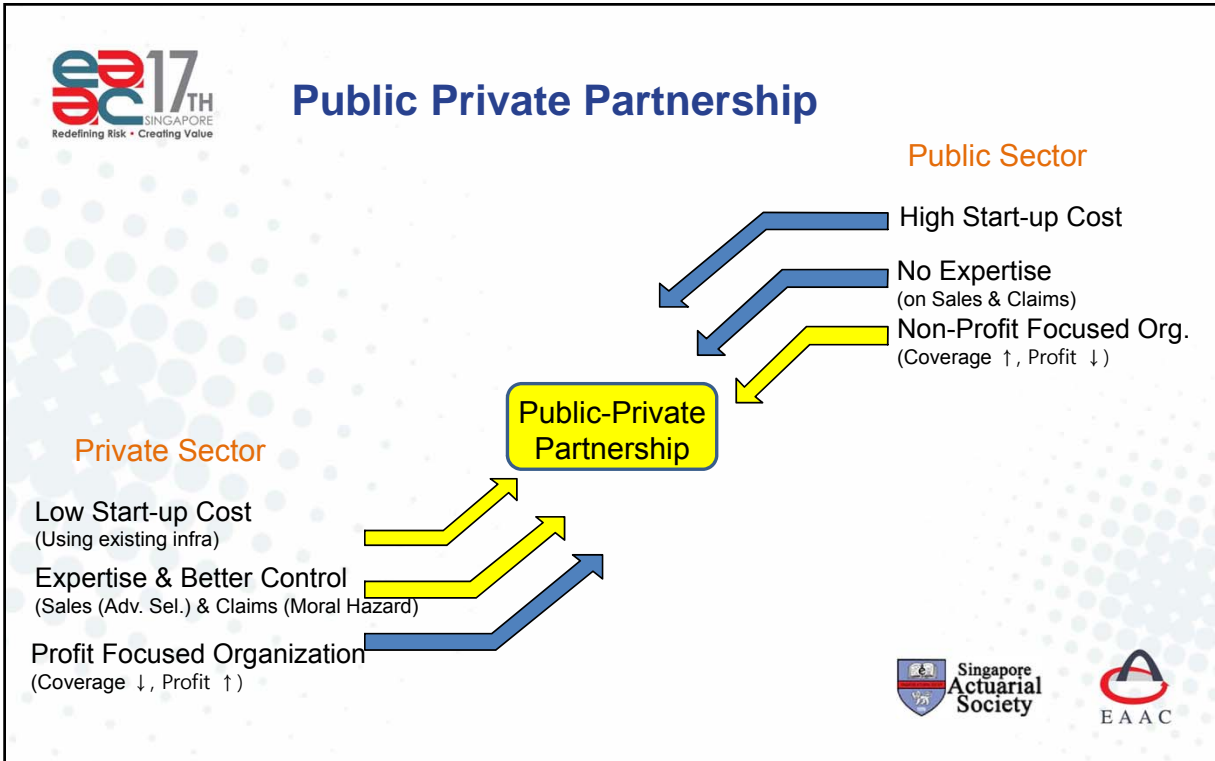


History of Korean Crop Insurance Program



* Penetration Ratio : Major 5 Crops(2013, 86% of Total Insured Risk Premium)





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1st Crisis & Program Reform

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1st Crisis History

□ Reasons for 1st Crisis

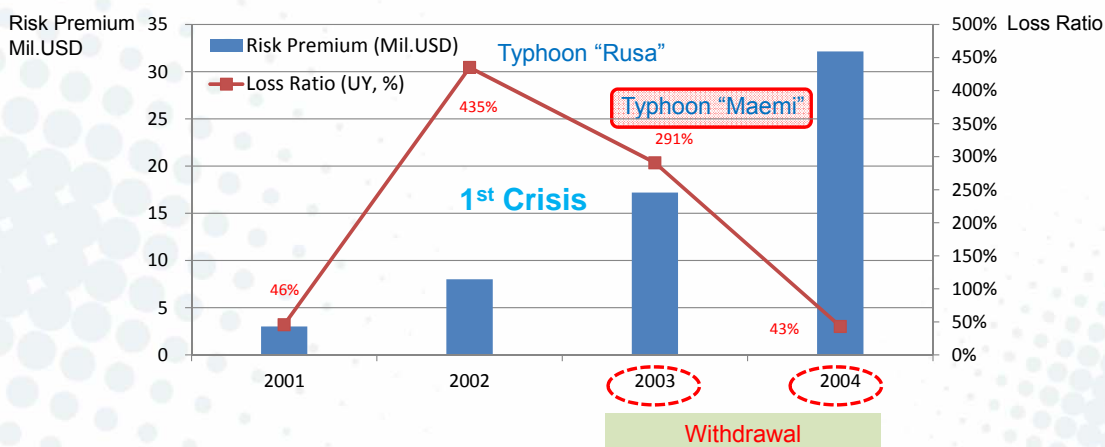
- ① Severe loss(L/R 435%) due to super typhoon “Rusa” (2002) 
- ② Low rates due to lack of statistics and no experience of CAT pricing
- ③ Insufficient rate increase in 2003
 - local/global (re)insurance company requested higher rate increase
 - government rejection due to budget constraint ($\pm 25\%$ rate change per year)



The PPP partnership lasted only one season, w/. withdrawal of the participating local/global (re)insurance companies in '03 & '04 seasons. Only Nonghyup(primary) remained & 100% risk intake in the following 2 seasons.



Program Results during 2001~2004 seasons






1st Crisis & Reform

□ Lessons from the 1st crisis

Severe losses(back-to-back)

- "Rusa"(2002, L/R 435%), "Maemi"(2003, L/R 291%)

- ① No serious study into cat exposures before program launching; no serious discussions and consideration for cat losses amongst the partners 
- ② No separation of pricing for Cat and Normal Losses
- ③ Despite lack of data, no plan for surprises such as large losses; no pre-agreed consensus on how to load cat exposure into pricing
- ④ In particular, no government budget to compensate for cat losses




Before launching the program, study your area's typhoons or cat history and load risk factor into pricing. Crop Ins. Is basically a cat program.



1st Reform

Public Private Task Force Team kick-off to restore the program ('04)

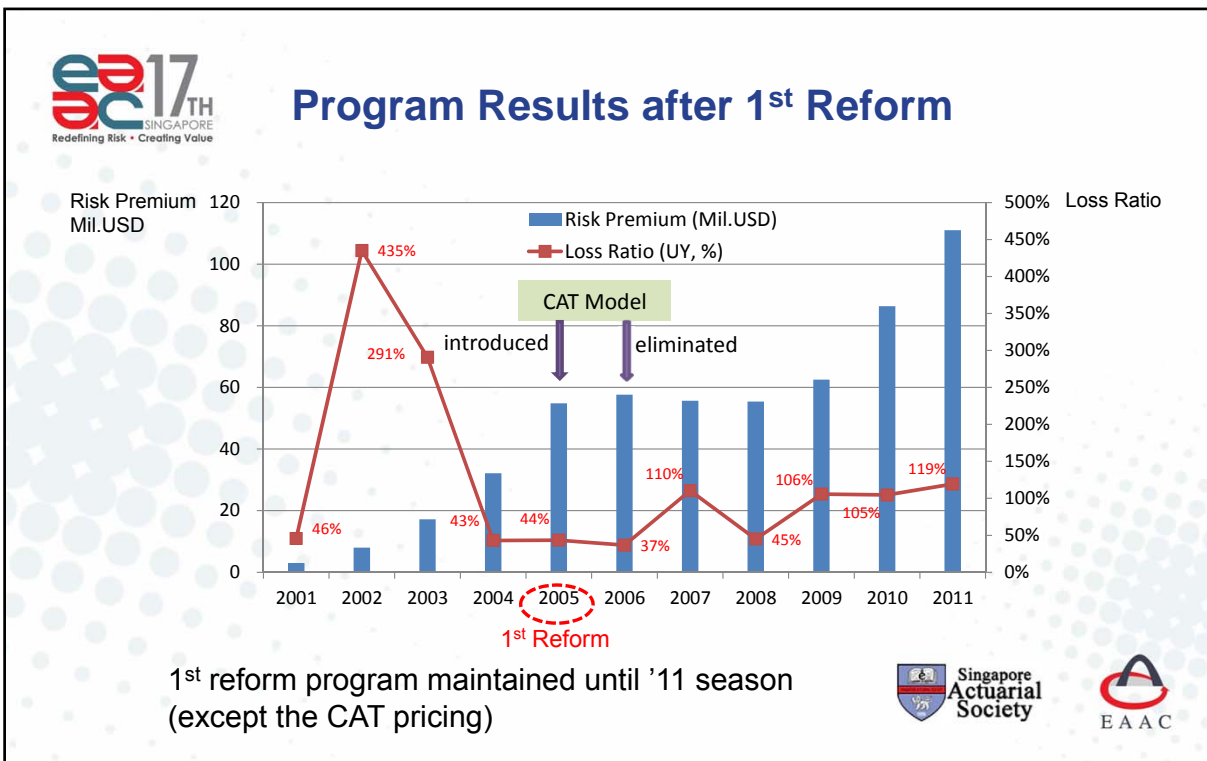
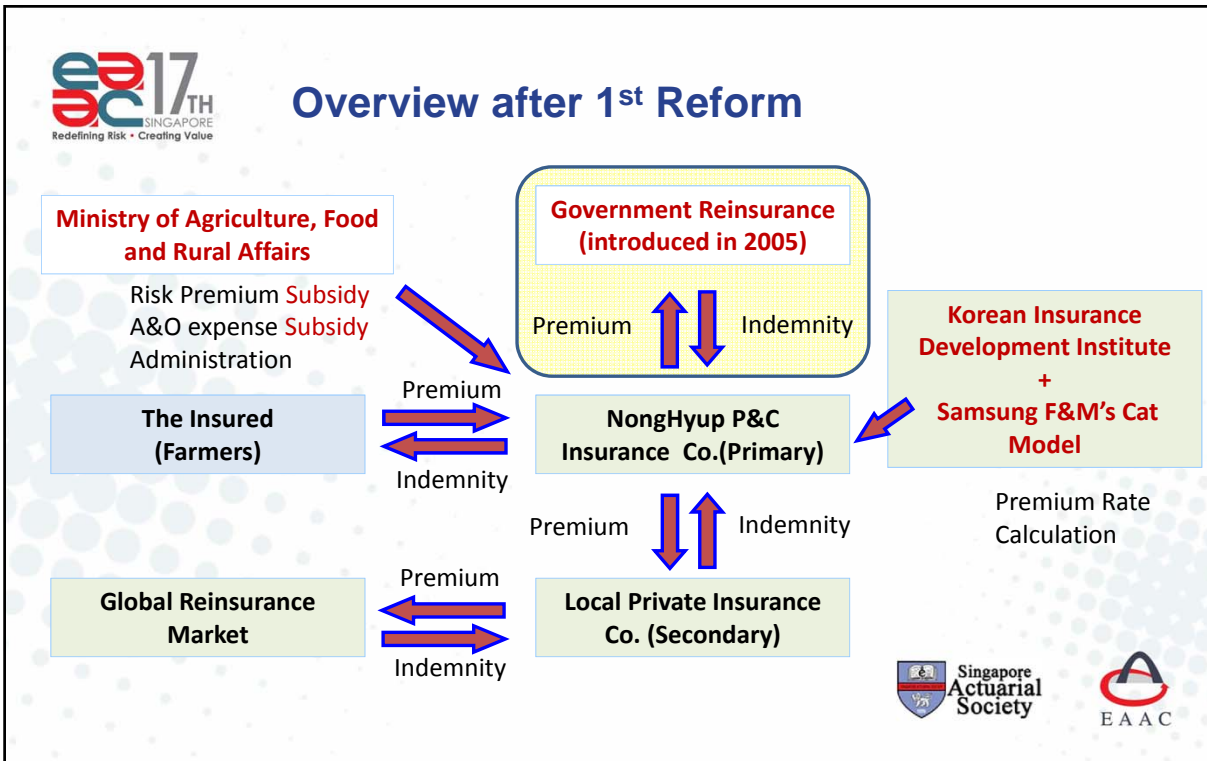
□ Results of 1st Reform

- ① Initially not enough rate increase ► Rates raised by 50% , using Cat Model (Samsung F & M's Internal Model) 
 - Before : experience rating method only (total premium, total loss)
 - After : experience rating method (50%) + CAT loading (50%) (only in '05)
- ② No immediate Budget available ► Government Reinsurance(Stop Loss) : Gov. pays all losses over L/R 180%
 - Main program L/R \sum Crop > 180% & Pilot program L/R (Each crop) > 180%
- ③ Insureds (farmers) doing claims handling directly ► Two-step claim handling
 - 1st claim review : farmers, 2nd : Nonghyup's claim handlers



Re-Entry of local/global (re)insurance companies in '05 season



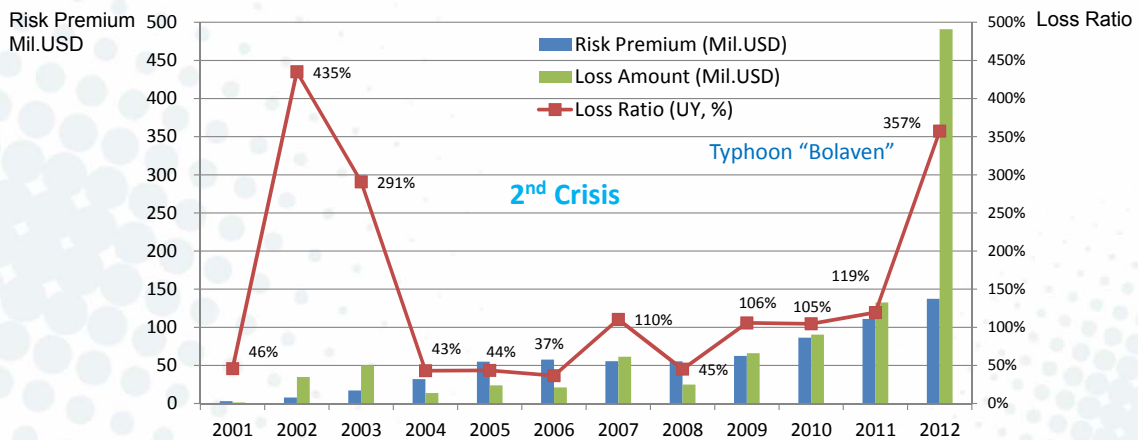




2nd Crisis & Program Reform



2nd Crisis Overview





2nd Crisis History

□ Reasons for 2nd Crisis

- ① w/ continued government pressure, rates steadily decreased from '05 level to the pre-'05 level
 - due to good loss results : 44%(2005), 37%(2006), 45%(2008)
 - due to exclusion of CAT pricing (after 2005)
- ② Unexpected losses during 2009~2011
 - hail(75% LR in Yr '09), spring frost(30% LR in Yr '10, 50% LR in Yr '11)
- ③ Severe losses (L/R 357%) due to super typhoon "Bolaven" (2012)
 - claim losses : 50 mil.USD (2003) → 467 mil.USD (2012)

* after loss cap(Gov. Reins.) 247 mil.USD



2nd Crisis History

□ Lessons from the 2nd Crisis

- ① Cat pricing was eliminated after 2005 ► Both "normal" losses and long-term cat losses must be accounted for, over a long haul of the program
- ② Besides typhoons, the threat of other big losses (hail and spring frost) were real but not accounted for.
- ③ Severe losses (L/R 357%) due to super typhoon "Bolaven" (467 mil.USD '12) ► After several years of growth in volume, lack of earnest effort on adverse selection has become a serious issue.
- ④ two-step claims handling was only spotty due to lack of resources & commitment ► claims moral hazard was not adequately managed.



For the survival of the program over a long haul, fundamentals such as cat losses, moral, and adverse selection cannot be ignored.





2nd Reform

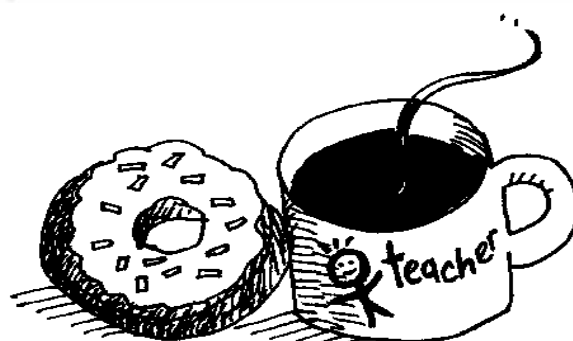
□ Results of 2nd Reform

- ① Rates raised by 33%
 - Before : experience rating method (total premium, total loss)
 - After : experience rating method X 105% (CAT loading 5%)
 - Now, reconsidering introduction of the cat model into the program
- ② Government Reinsurance(Stop Loss) : L/R 180% → L/R 150%
 - main program L/R $\Sigma(\text{Crop Group}) > 150\%$, Group 1/2/3
 - pilot program L/R (Each crop) $> 150\%$
- ③ Created new claim organization(200 people) for claim handling

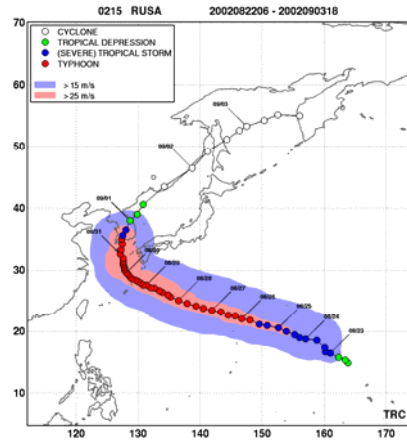
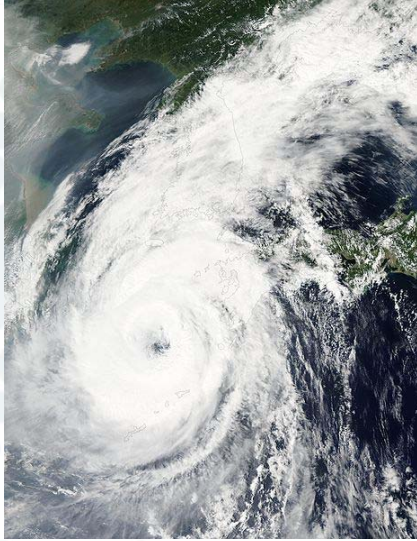
➔ **Successful Renewal in '13 season**



Q & A's



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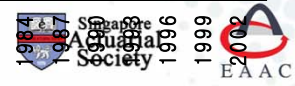
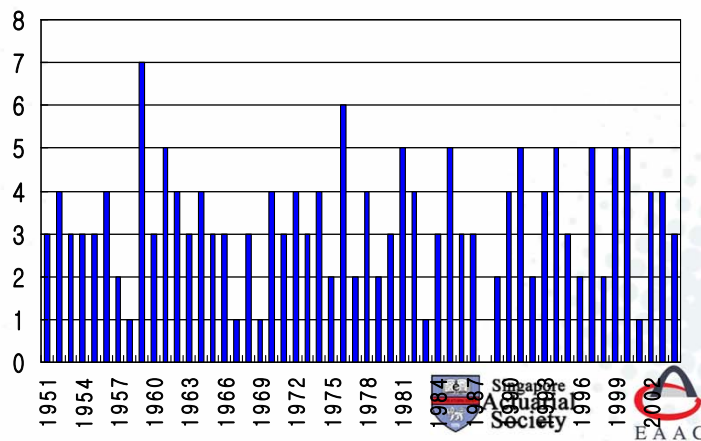
Typhoons in Korea

- 54 Years ('51-'04)
177 Typhoons

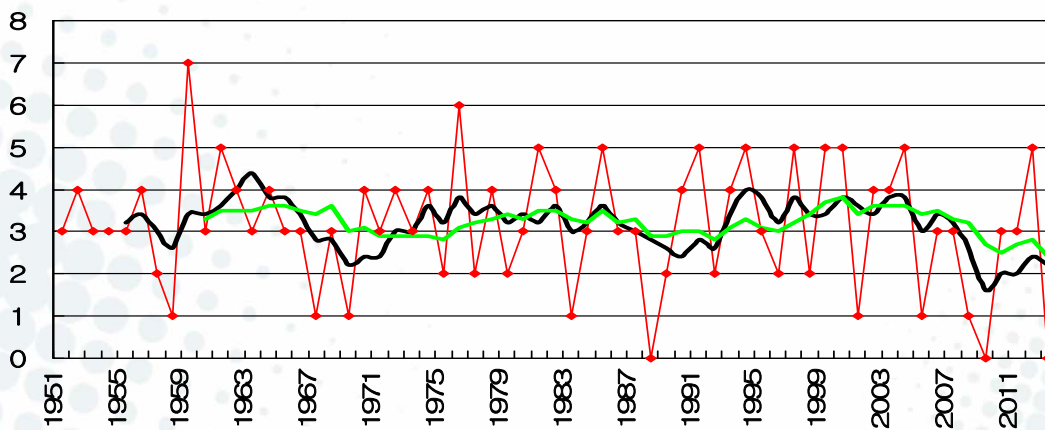
Annual Avg = 3.3

- 54 Years (105 Typhoons w/ losses
Annual Avg = 1.9)

Typhoon Frequency



Typhoon Cycles in Korea



—●— 1 Yr — Rolling 5 Yrs — Rolling 10 Yrs





Weather Data in Korea

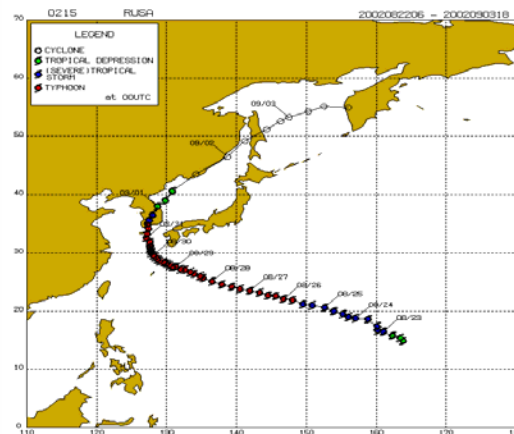
- 54 Years of Meteorological Data (KMA, RSMC, JTWC)
 - Publicly Available!
- Geographical Locations (Province/City/Town) – 254 zones
- 177 Typhoons tracked ('51-'04)
- About 45,000 Storm Eyes tracked



Weather Datasheet



- Examples on Typhoon Rusa
 - Location of storm eyes
 - 10 Min. Sustained Maximum Wind speeds
 - Storm path & Duration: Moving speeds
 - Pressure
 - Rainfall
 - Zone's distance from Storm Eyes





Building the Model

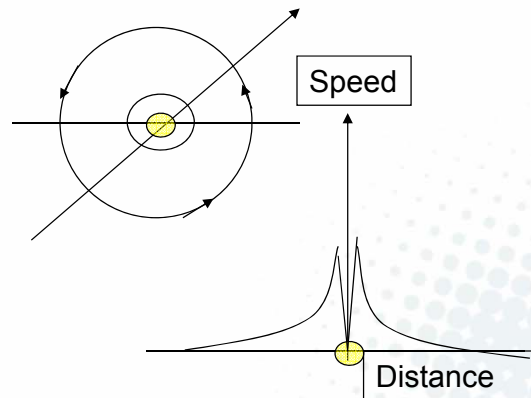
2 Major Steps in Building the Model

- Hazard Module
- Vulnerability Module

Hazard Module

- 54 Years of Typhoons “recreated” for each zone
- Combining Maximum Rotational Speeds w/ Moving Speeds by hour
- Calc. maximum speeds for each zone

Simplified Wind Model

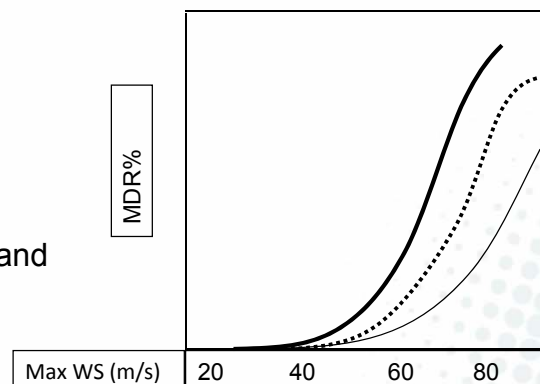


Building the Model

Vulnerability Module

- MDR (Mean Damage Ratio): Damage Function of max wind speeds, rainfall, distance, seasonality, crop
- Data : '01 ~ '04 Crop Claims
- Check : reduction & loss ratios and MDR of typhoons by zone

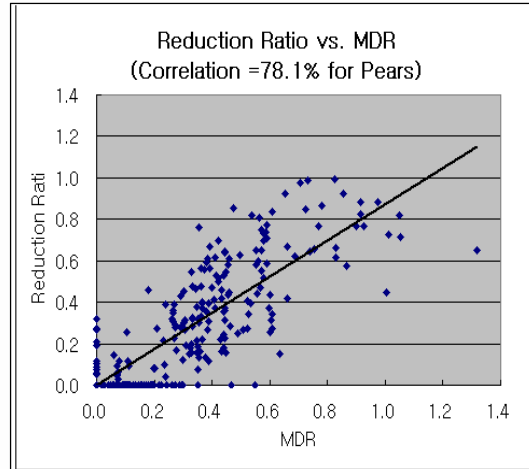
Vulnerability Curve





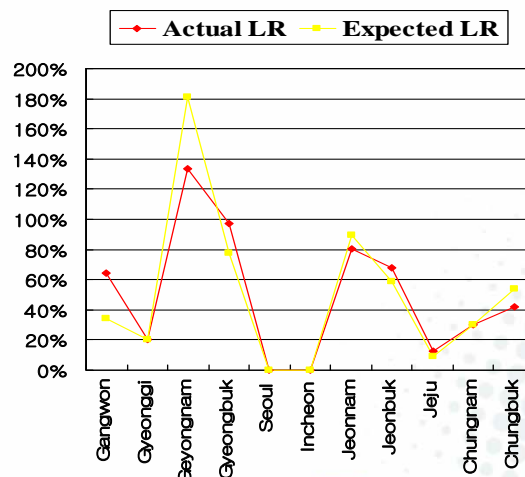
Validation

- For Typhoon Model, Validation to detail meteorological data
- For MDR, Validation to Historical Reduction Ratios by Zone
 - For pears, 78.1%
 - For Apples, 67.1%
 - For Grapes, 72.9%



Validation

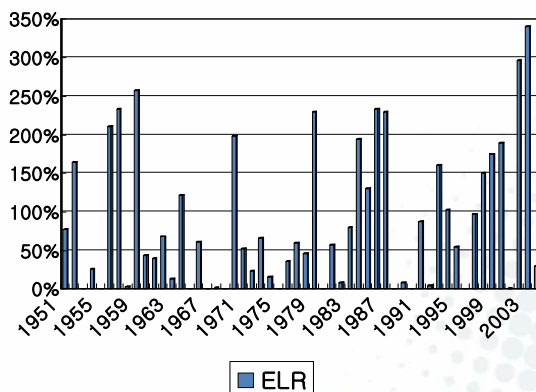
- Higher Correlation of Historical Reduction Ratios & MDR's by Province
- Validation to Loss Ratios by Crop
 - 2001-2004 Loss Results
 - Correlation by Province for all crops combined = 93% plus





Simulation

- 1,000 Monte Carlo Simulations of 5-yr periods
- Used Latest Risk Profile (Yr2004, to account for adverse selection)
- various simulation periods also examined



Typhoon Analysis



- Maemi & Rusa “types”: 18 Yr Return Period
- “very strong” typhoons (LR \geq 200%): Return Period of 8 Yrs
- 85% of past typhoons w/ LR $<$ 50%

