AIRCURRENTS

SEPARATING WIND AND FLOOD LOSSES FOR MORE ACCURATE MODEL RESULTS

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EDITOR'S NOTE: The AIR Northwest pacific basinwide typhoon model explicitly captures damage from both wind and flood in Japan, South Korea, mainland China, Taiwan, Hong Kong and Philippines. Because policy conditions for the two perils differ significantly only in Japan, the ability to break out typhoon wind and flood losses is currently available only for Japan.

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INTRODUCTION

The Japanese insurance market has a long history. Yet reporting of insured typhoon losses began just twenty years ago following the deregulation of the Nonlife Rating Organization (NLIRO) in 1990. Since then, the most significant Japanese typhoons from an insured loss perspective were Songda, Bart and Mireille . Notably, all of these events were relatively "dry," meaning that insured losses were driven primarily by damage from wind.

While important in Japan's history, these three storms do not tell the whole story of its typhoon climatology; Japan regularly experiences "wet" events too—those that deliver heavy rainfall that can impact large swaths of land and cause significant flooding even far inland. Interestingly, the most damaging wet events in Japan in the last century—Kathleen (1947), Ida (1958), Trix (1965), Fran (1976) and Bess (1982), each of which inundated more than 100,000 houses —occurred before the deregulation of NLIRO; that is, before records of insured losses from typhoons were kept. It is perhaps in part due to this underreporting that insured flood loss in Japan is less understood today than insured wind loss from typhoons[3].

Figure 1 shows the number of homes damaged by significant typhoons in Japan since Kathleen in 1947. The numbers are broken down according to the primary driver of damage: wind or flood. The distribution of damage indicates Japan's high susceptibility to both wet and dry events. Yet despite the persistent presence of flood losses—and nearly 100% loss from flood in the case of Kathleen—some insurers and reinsurers in Japan today do not perceive precipitation-induced flood as a severe risk. In fact, some estimate flood losses by applying a factor: about 5-10% of the overall insured loss from the typhoon. But flood losses have exceeded 5-10% of total insured loss on many occasions throughout history. In 2004, for example, flooding from Typhoon Tokage—a storm that damaged thousands of dwellings in Toyooka—contributed nearly 30% of the storm's total insured loss value. What is also notable about Figure 1 is that wind and flood damage is not highly correlated.

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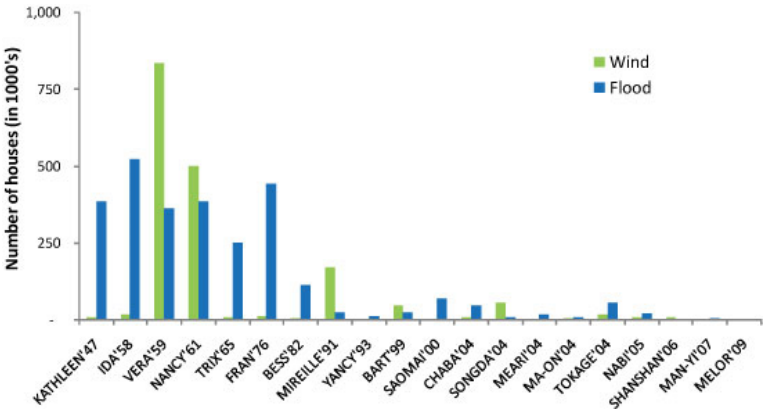

Figure 1: The green bars indicate the number of partially or completely destroyed houses, where the destruction in these instances is primarily from wind. The blue bars show the number of inundated houses, where damage is primarily from flood. Note that damage from wind and flood is not highly correlated. (Source: Digital Typhoon Network)

BREAKING OUT LOSSES BY WIND AND FLOOD: A NEW CAPABILITY IN CLASIC/2™

Insurance coverage for wind damage in Japan is automatic, included in fire insurance policies, but insurance coverage for flood is not; those who want it must purchase comprehensive policies or select newer types of policies being developed for flood in Japan today.

Not only is insurance coverage different for wind and flood perils in Japan, insurance payout conditions are as well; typically, wind payout following a typhoon event is the actual loss with a franchise deductible of JPY 200,000 per risk. The most common flood policy condition is a step payout: a specified payout is made only when the actual damage observed falls within a specified range.

Prior to the release last fall of AIR's basinwide model for the Northwest Pacific in CLASIC/2, companies operating in Japan and applying these complex flood policy conditions, or determining payout from a typhoon event using step payout conditions, began their calculations with a flood loss value—a value that may have been derived by assuming 5-10% of the total insured loss. Using the latest release of the AIR model, companies writing business in Japan can have significantly more confidence in their estimates of precipitation-induced flood losses. CLASIC/2 Version 12.5 now allows users to run flood-only scenarios, whereby they can obtain loss estimates for the flood peril alone. (They can also obtain separate loss estimates for wind.) As per the Japanese insurance market, CLASIC/2 also allows users to input separate policy conditions for wind and flood. The benefits of this ability to separate flood loss from wind loss and apply peril-specific policy conditions are described next.

APPLYING POLICY CONDITIONS APPROPRIATE TO THE PERIL RESULTS IN A CLEARER UNDERSTANDING OF THE PERIL'S TRUE CONTRIBUTION TO INSURED LOSS

The ability to separate flood loss from wind loss is particularly powerful in light of the fact that, as previously mentioned, policy conditions for the two perils differ in Japan. Using CLASIC/2, companies can, for the first time, apply company-specific policy terms for flood directly to flood losses. Modeling flood losses with unique flood policy conditions (as well as flood take-up rates) can greatly impact a company's average annual losses and also its high exceedance probability (low return period) losses, such as losses from typhoons with low sustained wind speeds—storms than can nevertheless deliver significant precipitation. Determining the insured flood loss they contribute is critical to risk assessment.

The ability to break out losses is also invaluable in light of the widespread perception that flood losses from typhoon events in Japan can be estimated by assuming 5-10% of a typhoon event's total insured loss. As previously discussed, this strategy may significantly underestimate flood risk.

A Clearer View of Hazard Leads to A Clearer View of Risk

Confidence in the wind and flood loss estimates derived from the AIR Japan typhoon model is bolstered by significant enhancements to the hazard and vulnerability components of the model, including an update to the wind field formulation, explicit modeling of precipitation-induced flooding using a third-generation precipitation module and new and recalibrated damage functions, all of which work together to provide the most accurate view of typhoon wind and flood risk possible. When calculating insured losses from flood, the AIR model also captures the impact of Japan's flood defense systems.

With the ability to break out flood losses, companies may find their risk is higher (or lower) than they had originally thought.

Figure 2 illustrates the impact of modeling flood losses using flood-specific policy conditions for Sample Company A. Not untypically, Sample A Company's exposure data was at prefecture (aggregate) level, which CLASIC/2 was able to disaggregate to 1 km grid level. The occupancy breakdown was nearly 50% residential and 50% commercial/ industrial, which is similar to the industry-wide distribution. When Company A's losses were modeled using peril-specific policy conditions, annual aggregate losses increased by roughly 37%.

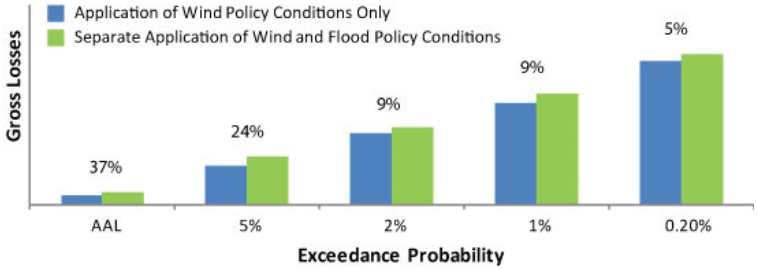

Figure 2 Modeling wind exposure using wind policy conditions and flood exposure using flood policy conditions significantly impacts Sample Company A's annual aggregate (AAL) and high exceedance probability (low return period) losses. (Source: AIR).

By enabling clients to break out wind and flood losses and account for peril-specific policy conditions common in Japan today, CLASIC/2 allows companies to more accurately assess their overall risk. Insurers can more accurately underwrite portfolios that include flood cover, instilling confidence in their policy holders. The ability to break out wind and flood losses gives underwriters greater power in risk selection; they may choose to write fewer risks, or take on greater risk with a greater premium for diversification. Breaking out losses can also provide companies with a means to determine areas that may be overpriced or underpriced, thereby giving underwriters protection from having too little capital or too much capital on hand. Finally, more accurate risk assessment enables better reinsurance purchasing decisions

Reinsurance companies are better equipped to understand their wind and flood exposure and more accurately price the risk to their cedant portfolios. They can have more confidence that the data they obtain from insurers more accurately represents flood risk. Indeed, the often-held view that flood-dominated typhoon events always result in lower insured losses requires a hard look; "wet" storms—such as 2001's Typhoon Saomai, which caused over JPY 100 billion in insured losses —can significantly impact a reinsurer's portfolio.

AIR Japan Wind and Flood Macro

To help companies like Sample Company A prepare their wind and flood exposure data import files—and thus leverage the new wind and flood loss modeling capability in CLASIC/2— AIR has created an easy-to-use tool with policy condition assumptions built in. Details about these assumptions and how to use the AIR Japan Wind and Flood Macro are available to AIR clients here on the AIR website (login required).

Detailed Analyses are Possible Even with Aggregate Wind and Flood Data

Modeling wind and flood risk using peril-specific policy conditions is a powerful technique by which to yield more accurate modeled loss results for Japan typhoons. But results can be made more accurate still if disaggregation is applied to exposure data otherwise submitted at the aggregate level. While insurers in Japan often collect detailed exposure data (ku or sonpo level), many reinsurers still only receive prefecture-level data.

To help reinsurers refine their catastrophe risk analyses, innovative disaggregation techniques are available in CLASIC/2—techniques that distribute prefecture-level exposure data down to 1 km x 1 km grid-level based on distributions in AIR's detailed industry exposure database for Japan. While running models with aggregate exposure data can provide a quick, if broad, view of the risk, high resolution data is essential for deriving maximum value from detailed models like AIR's basinwide typhoon model. This is particularly true in the case of modeling the risk of typhoon flooding where losses are highly sensitive to underlying elevation and land use/land cover data.

For more information on AIR's disaggregation techniques, see the AIR Current Exposure Disaggregation: Building Better Loss Estimates.

CLOSING THOUGHTS

As Solvency II is implemented in Europe, its impact is being felt worldwide, including in Japan. As in Europe, Japanese insurers and reinsurers armed with a better understanding of their risk can more accurately determine their capital needs under increasingly strict regulation. Because this regulation insists on making the best interpretation possible of data and utilizing the most appropriate modeling tools available, treating wind and flood as separate perils and applying appropriate peril-specific policy conditions provides a better means of determining capital needs.

Going forward, Solvency II will continue to drive more analytical approaches to risk assessment. In this context of balancing stringent capital requirements with the need for having enough capital to finance growth, the capabilities available in the AIR model represent an even more important innovation.

Today, insurers and reinsurers in Japan's complex insurance market will continue to look for ways to better control their pricing and to be discriminatory when it comes to identifying which policies to underwrite. If they wish to efficiently manage losses from typhoon-induced flood, an important peril in this region, they need a sophisticated understanding of their flood risk, which AIR's Northwest Pacific basinwide typhoon model is uniquely poised to provide.

ABOUT AIR WORLDWIDE

AIR Worldwide (AIR) is the scientific leader and most respected provider of risk modeling software and consulting services. AIR founded the catastrophe modeling industry in 1987 and today models the risk from natural catastrophes and terrorism in more than 50 countries. More than 400 insurance, reinsurance, financial, corporate and government clients rely on AIR software and services for catastrophe risk management, insurance-linked securities, site-specific seismic engineering analysis, and property replacement cost valuation. AIR is a member of the ISO family of companies and is headquartered in Boston with additional offices in North America, Europe and Asia. For more information, please visit www. air-worldwide.com.