Japan's Insurance Market 2019

The Toa Reinsurance Company, Limited

Japan's Insurance Market 2019

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To Our Clients

It gives me great pleasure to have the opportunity to welcome you to our brochure, 'Japan's Insurance Market 2019.' It is encouraging to know that over the years our brochures have been well received even beyond our own industry's boundaries as a source of useful, up-to-date information about Japan's insurance market, as well as contributing to a wider interest in and understanding of our domestic market.

During fiscal 2018, the year ended March 31, 2019, the world economy generally remained on a moderate recovery track, as the U.S. economy grew steadily while China and other emerging economies continued to experience stable growth. However, in the second half of fiscal 2018, concerns about the economic outlook became widespread against the backdrop of the intensifying U.S.-China trade friction and political issues in Europe.

Overall, the moderate recovery of the Japanese economy continued. Despite the impact of a series of large-scale natural disasters such as earthquakes and typhoons, capital investment continued trending upward while corporate earnings improved, and personal consumption picked up too, reflecting an improvement in the employment and income environment.

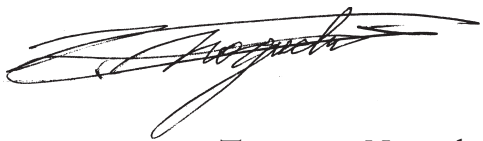
In the reinsurance industry, the trend toward softening of reinsurance premium rates and conditions, which has been evident in recent years, halted to some extent, reflecting the frequent occurrence of large-scale natural disasters. Nonetheless, market conditions remained competitive, given the abundant capacity of the reinsurance market.

Going forward, the business environment is expected to remain challenging in view of fierce competition to win contracts in the reinsurance market, frequent occurrence of natural disasters, and the need to respond to climate change, the increasing complexity of risks, and strengthened international regulations and frameworks.

In accordance with the "Mission 2020" medium-term management plan, the Group will provide clients with higher quality reinsurance solutions and value-added services while further strengthening the management foundation to deal with future issues, in order to achieve sustainable growth.

Everyone at the Toa Re Group will do their utmost so that the Group can fulfill its mission as a reinsurance company "Providing Peace of Mind," as articulated in the Toa Re Mission Statement.

In conclusion, I hope that our brochure will provide a greater insight into the Japanese insurance market and I would like to express my gratitude to all who kindly contributed so much time and effort towards its making.



Tomoatsu Noguchi
President and Chief Executive
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1. Disaster Risk in Megacities

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1. Introduction

Initiatives to make cities more resilient to disasters are generally known as urban disaster prevention initiatives, and have been implemented in Japan since ancient times because of the large number of wooden houses, housing density, and cultural and regional features including the high probability of earthquakes. In particular, as the size and scale of cities has expanded in concert with increased political and economic concentration (accumulation), urban disaster prevention initiatives have also become more numerous because vulnerability to accumulation issues has become increasingly apparent. Recent large-scale disasters, including the 1959 Isewan Typhoon (Typhoon Vera), the 1995 Great Hanshin-Awaji Earthquake, and the 2011 Great East Japan Earthquake have resulted in significant changes in disaster prevention policy. Today, there is greater urgency to introduce policies and plans that meet Japan's new and diverse disaster prevention needs. One of these policies and plans is known as "Disaster Management 4.0," which emphasizes the need for all citizens to consider disaster management as a personal issue and to take individual responsibility in preparing for disasters.

Incidentally, urban development that incorporates disaster prevention measures may be characterized by three features that are necessary considerations. The first is "objectivity." In many cases, there are physical and social mechanisms involved in disaster-related phenomena. Therefore, making our cities resilient to disasters requires at least a minimum knowledge of disaster phenomena and human behavioral principles. Without this knowledge, understanding uncertainty and reaching agreement on tolerable levels of risk are especially difficult, as is formulating appropriate disaster prevention measures. The second feature is "diversity." Disaster prevention must cover a broad range of measures because of the diverse concepts involved in factors such as the types of disaster, time scales, participants, and the purpose of the measures. Stated euphemistically, there is a high degree of freedom to act; however, to be honest, most governments and residents do not know which approaches will be effective for them. A strategic perspective that considers an effective combination of solutions is therefore essential. The third feature is "regional characteristics." Disasters vary greatly due to regional characteristics, so what needs to be done for a given region also varies greatly. In addition, in considering issues such as post-disaster recovery, desired urban outcomes vary significantly by region, so people have to draw out the latent power of each city to achieve the varied demands of each region. In other words, independent decision-making by the residents of the region is required.

This paper reconsiders disaster risk in megacities by examining the unique characteristics of disaster prevention policies and measures in densely populated areas where everything is concentrated, including people and wealth, with due regard for the regional characteristics that are key to urban disaster prevention initiatives.

2. Unique Characteristics of Disaster Prevention in Megacities

The United Nations Statistics Division defines a megacity to be an urban agglomeration with more than 10 million inhabitants with a "population contained within the contours of a contiguous territory inhabited at urban density levels without regard to administrative boundaries," and takes into account three criteria. Twenty-one cities worldwide meet these criteria (35 cities meet at least one criterion), and the largest megacity is Tokyo (34.7 million people using the UN standard). Japan's large metropolitan areas rank high among the world's megacities according to a Munich Reinsurance Company ranking of natural disaster risk (hazard, vulnerability (loss susceptibility), and exposure). From the perspective of "exposure" due to accumulation of people, values and infrastructure, Tokyo, Osaka, New York, Paris and London stand out among the world's megacities.

Accumulation is the first thing to consider in devising disaster prevention plans for megacities. Yet this very accumulation reflects positive synergy among the economy, information and knowledge that in normal times is the greatest merit of a megacity. However, from the point of view of a disaster that has the potential to cause the most extensive damage, extreme accumulation in megacities means they are subject to greater destruction efficiency than elsewhere, and the damage can affect other regions in various ways. For example, the impact of collapse of dense housing in a megacity is enormous compared to the collapse of a house in a field. Such impact, a sort of "negative externality" represented by obstructed roads, impediments to evacuation and post-earthquake fires, is not negligible. Japan has been implementing relevant countermeasures during the modern era. The city of Edo (old Tokyo) established open spaces, including open plazas around bridges, to impede the spread of fire. During World War II, building evacuation and structural technologies to protect against fire were developed. After the war, physical controls to reduce damage included the introduction of fire breaks and non-combustible roadways, and the creation of carefully planned open spaces. These measures were taken because dangers related to high building concentration (that might lead to fire propagation) and the over-concentration of evacuees were recognized.

Since the Great Hanshin-Awaji Earthquake, the government has been complementing these external diseconomies that result from accumulation in ways such as providing free diagnoses of earthquake resistance and assistance for earthquake-proofing for housing. Moreover, initiatives were launched after the Great East Japan Earthquake in 2011 to control the return en masse of people who have been stranded due to mass transit disruptions. However, large modern cities involve complex systems and sophisticated industrial structures, so the indirect economic damage caused by disasters is extremely large, and the paralysis of central management functions among key organizations including government, media and finance can be expected to have negative ripple effects. This consequently affects the entire world as well as Japan, and slows the emergency response and the pace of recovery in megacities. In other words, when considering the disaster prevention measures of large cities, the issues of decentralizing and multi-layering (redundancy) of the social functions of megacities (as represented by the function of Tokyo as the capital of Japan) are just as important as controls on the physical phenomena

associated with accumulation, including impediments to evacuation from the collapse of buildings, the spread of fire, and evacuation behavior. As described above, megacities exhibit the characteristics of excessive population and structure density, and they are also hubs that incorporate peripheral coordination and central management functions relating to quantifying disaster risk and formulating relevant countermeasures. Considering these issues, disaster prevention planning for megacities must therefore encompass not simply the security of local buildings and neighborhoods, but also the protection of lives, functions and social systems with a wide-area perspective, along with post-disaster recovery and revitalization.

The second issue involves human factors represented by limited disaster experience, lifeline dependence, and community collapse. Megacities in Japan have not experienced a major disaster since 1945, the end of World War II, so the ability of residents to respond to disasters in megacities where the sense of community might collapse is likely to be quite low. The fact is that Tokyo only experienced a maximum seismic intensity in the upper 5 range when the Great East Japan Earthquake occurred, but massive confusion resulted largely from the inability of people to return home. Needless to say, people are dependent on urban amenities including well-developed infrastructure. The infrastructure environment in normal times encompasses everything from electricity, gas and water to distribution, information and transportation, and efficiently meets all of the needs of the enormous daytime population, but could fail in any number of ways should a disaster occur. The same applies to government capabilities such as firefighting and emergency services. Further, the impact on information technology in particular has presumably become increasingly significant in recent years. In situations involving major disasters, social networks often problematically focused on false information such as harmful substances in the rain following the Great East Japan Earthquake and the escape of lions from zoos following the Kumamoto Earthquake. When there is a breakdown in the balance between information supply and demand during a disaster, the rapid spread of questionable information involving speculation reflects an attempt to ease the anxiety of residents. This raises the prospect of other issues including behavioral breakdowns during evacuation, panic caused by information, and damage to the reputation of tourist destinations.

People who live for extended periods in large cities naturally come to enjoy urban life and the advantages of access to ample information, and assume optimized payments for all associated costs – however, it is misconception because such a promise is only valid under normal circumstances. Social systems that incorporate redundancy are often deemed wasteful despite the assumption that disasters will occur. Moreover, the prevalence of LPHC (low-probability, high-consequence) type disaster risk makes investment in disaster prevention even more difficult. Rezoning, redevelopment, investment in physical infrastructure, and easing of floor area ratio regulations in the past to help enhance the safety of urban neighborhoods all seem less welcome today. Solving today's problems using only planning theory premised on disaster prevention principles and lackluster economic growth is therefore difficult, so proposals for new planning techniques are expected, as is a new understanding of the concept of values.

The final issue is the novelty of disaster risk. As mentioned above, no large city in Japan has experienced a large-scale natural disaster since the 1923 Great Kanto Earthquake, and it is difficult to picture the possible extent of damages. Complex disaster risk is a representative potential problem. Japan's megacities have a very high fire risk due to building density, and road closures due to the collapse of buildings may disable evacuation routes and the movement of emergency vehicles. Economic efficiency and other factors lead many people to live in places with high disaster risk, such as unstable ground, and tsunami risk is another concern depending on the location. These complex disasters that manifest themselves in multiple locations inhibit usual evacuation behavior and processes, and many evacuees will likely be confused about the timing of evacuation and evacuation destinations.

On the other hand, evacuation plans and measures for people who are having difficulty returning home are often made separately for each disaster, but must cover such diverse events as urban fires, tsunami, and flood. Due to lack of experience with such complex disasters, planning for effective evacuation in the case of a complex disaster is still inadequate. In addition, megacities contain many areas undergoing rapid neighborhood renewal and change, and regulation may lag. As in the case of the evacuation behavior from the complex disasters mentioned above, it is particularly important to take a positive attitude about estimating risks that have not been experienced and taking appropriate measures in such areas. Generally speaking though, imagining novel disaster phenomena and estimating their damage in advance is very difficult.

3. Conclusion

As mentioned above, this paper presents characteristics of disaster risk in megacities. Disaster research involves the concept of the "dysfunction of experience," in which past experience may actually increase the damage due to the region-specific features of the disaster phenomena. In other words, we must take seriously the lessons learned from past large-scale disasters, while enhancing the flexibility to predict and respond to the novel phenomena of large-scale disasters in megacities by gaining sufficient understanding of their region-specific nature. The smart city era is now approaching – it will utilize information from sensors placed around the city and empower the use of various privately held data such as mobile phone and POS data. In the past, complexity posed challenges to complete understanding, modeling and control of large-scale disasters in megacities. Now the application of popular deep learning and big data may play a meaningful role in terms of cross-pollinating the skill sets of experts in various fields and identifying regularities that had been difficult for people to understand. Applying deep learning and big data to proposing and implementing disaster planning will require specialized expertise and elemental technologies.

2. Collaboration between (Re)insurance Companies and Local Governments to Enhance Urban Resilience

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** This is a translated summary (original in Japanese) of a paper entitled "Collaboration between (Re)insurance Companies and Local Governments to Enhance Urban Resilience" by Tomo Sugiura. It was originally presented in GIIJ Report Vol. 126 (General Insurance Institute of Japan, 2019.1).*

1. Introduction

Urbanization is progressing rapidly worldwide. While urban residents accounted for 30% of the total global population in 1950, this figure is expected to reach 55% in 2018 and 68% in 2050. Many cities are struggling to cope with the higher population density and face problems such as dysfunctional infrastructure and the aggravation of disaster risks. In calling for enhanced urban resilience in its Sustainable Development Goals, the United Nations has also recognized the importance of this issue. To address these problems, local governments need to formulate policies that are aligned with their own economic and social backgrounds, geographical characteristics, developmental stages, risk factors, and so on.

Given that enhanced urban resilience is correlated with an increase in insurance provision and investment opportunities, insurance companies, including reinsurance companies, can be key stakeholders in enhancing urban resilience. Through their function as experts in risk management, underwriting, and risk transfer, and as institutional investors, they can help resolve urban issues using a broad array of knowledge and data. Conventionally, insurance companies and local governments have cooperated primarily in post-disaster responses, but insurance companies have rarely participated in urban policy discussions from the initial study phase. In recent years, however, growing awareness of the urgency of easing urban problems, and of the mutual benefits that collaboration between local governments and insurance companies can produce, has led to an increase in such cooperation.

2. Collaboration between Insurance Companies and Local Governments

(1) Status and Issues

Notwithstanding the recent trend for insurance companies to participate more actively in enhancing urban resilience, the capabilities of insurance companies have not been fully utilized. This is because, as mentioned above, collaboration between local governments and insurance companies still mostly takes place in the final phase of urban policy discussions, and usually after a disaster occurs. By participating in the earlier study phases before major decisions are made, insurance companies may have much to contribute regarding urban risk management involving infrastructure development, climate change adaptation and alleviation, disaster risk mitigation and the like.

The current lack of cooperation between insurance companies and local governments may explain the increasing gaps in supply and demand that local governments are tasked with addressing, particularly in areas such as protection, disaster risk mitigation, and infrastructure investment. For example, infrastructure created without incorporating appropriate data and expertise could be exposed to greater risks, which would create a vicious cycle that can complicate obtaining insurance and investment. Conversely, in terms of risk mitigation measures that enhance infrastructure resilience, there is positive correlation among the interests of insurance companies, local governments and residents.

(2) The Role of Insurance Companies

Taking advantage of their expertise in risk management, underwriting, risk transfer and infrastructure investment, as well as the extensive data they possess, insurance companies can demonstrate their central, catalyzing role in enhancing urban resilience with their multifaceted capabilities.

(a) Risk Analysis for Formulating Effective Urban Policies

Insurance companies are risk assessment and management experts that possess relevant data, and can therefore help local governments analyze the risks they face more accurately. Proper risk analysis enables the formulation of effective urban policies and infrastructure development plans based on risk-based financial decisions. For example, in Copenhagen and Oslo, collaboration with the insurance industry has brought about access to detailed insurance payment-related data not generally available to local governments. This has enabled them to map flood risks based on geographical information systems, and formulate precise climate and flood risk management plans.

(b) Promoting Urban Infrastructure Investment

Securing and promoting investment to strengthen the resilience of communities and infrastructure is the key to implementing urban policies. As institutional investors seeking to match assets and liabilities over the long term, insurance companies can play an important role through infrastructure investment. In this case, because of their focus on gaining increased long-term investment returns, insurance companies have a direct interest in reducing regional and infrastructure risks. For insurance companies, there is a synergy and strong correlation between contributing to urban policy development based on adequate risk analysis as experts in risk assessment/management, and investing in enhanced resilience of communities and infrastructure as institutional investors.

(c) Promoting Effective Funding

Amid the increase in economic costs associated with disasters, local governments need to structure more diversified, effective funding solutions and reduce their reliance on the national government measures such as disaster recovery funds. In recent years, local governments have started using insurance schemes and financial products in their efforts to more effectively utilize their financial resources, including those for disaster countermeasures. As risk underwriters and institutional investors, insurance companies could analytically propose or take part in various solutions, including parametric insurance, impact bonds and resilience bonds, in addition to traditional general insurance. Some of these solutions can generate funds for local governments quickly and directly should a disaster occur, making them more cost effective than usual disaster recovery assistance from the national government.

(d) Providing Risk Mitigation Incentives and Products

Providing risk mitigation incentives through insurance product design and customer engagement can promote more appropriate physical risk management (such as land use and architectural planning), and contribute to enhanced urban resilience. For example, by proposing countermeasures against climate risk and terrorism risk, and reflecting risk mitigation efforts in premiums and coverage to issue risk signals, insurance companies can help raise the level of resilience to create an environment in which insurance is available at a reasonable premium. Furthermore, there are cases where insurance companies and local governments could cooperate to develop insurance products that address the unique issues and risks faced by residents.

(3) The Effect of Collaboration

Collaboration between insurance companies and local governments eliminates knowledge gaps and creates win-win outcomes. The main benefits for insurance companies include improved understanding of the decision-making process and complexity within local governments, as well as the establishment of smooth, long-term relationships with them. This collaboration can also create business opportunities. For example, it may help insurance companies capture opportunities and take the lead in the market by dealing with risks that cities are increasingly expected to face, identify the potential of products and services besides those that transfer risk, make use of data that local governments provide, and jointly develop innovative products and services such as those needed for smart cities. In addition, they can expect an increase in long-term opportunities for the provision of insurance, as the enhancement of urban infrastructure resilience should lead to a reduction in claim payments associated with social issues including pollution, poor living environments, accidents, violence, and vandalism, and ultimately raise the insurability of areas where insurance has not previously been available due to high risk levels.

3. Key Examples

(1) 100 Resilient Cities

Launched by the Rockefeller Foundation in 2013, 100 Resilient Cities is a framework designed to promote enhanced urban resilience. More than 100 public and private organizations from a variety of fields, including insurance, participate in the framework and help cities deal with physical challenges such as natural disasters and socioeconomic stresses including high unemployment, uneconomical public transportation systems, widespread violence and crime, and chronic shortages of food and water. The 100 participating cities receive the resources they need to develop strategies and roadmaps for enhancing resilience. Cases that involve insurance companies include the cities of Melbourne, Australia and Da Nang, Vietnam.

(a) Melbourne

As part of its resilience strategy, Melbourne aims to develop innovative insurance products which make it easier for its residents to purchase coverage that meets their needs. The city promotes this initiative mainly to support low-income groups who are unable to obtain existing insurance products, due to high premiums and coverage that exceeds demand. In low-income communities where public transportation infrastructure is inadequate, it is essential to own a car to obtain employment and access public services. Therefore, Melbourne recognizes that the ability of residents in such communities to obtain basic automobile insurance is crucial for enhancing resilience. The initiative promotes a low-cost insurance scheme developed by Suncorp and Good Shepherd Microfinance to provide basic home and contents insurance and car insurance to pensioners, people who are eligible for public welfare, and households with an annual income of less than AUD 48,000. Melbourne plans to work with other insurance companies in the future to promote various products such as insurance for small and medium-sized enterprises (SMEs).

(b) Da Nang

Da Nang is a port city in central Vietnam that faces natural disaster risks (mainly typhoons). In 2016, it became the first city in Vietnam to announce a resilience strategy. Based on an analysis of past, present and future risk situations, this strategy sets out various measures to enhance the city's resilience in cooperation with Swiss Re and other companies. Measures related to insurance include (1) conducting analysis of financial risks and an insurance mechanism for disaster responses, and (2) researching and piloting an insurance mechanism for disaster resilient housing. For item (1), Swiss Re and other affiliated organizations cooperate to achieve more effective disaster responses by collecting information, analyzing financial risks, and presenting solutions, given that under current relevant regulations local budgets allocate only a 2% reserve for corrective work following a disaster. For item (2), Swiss Re performs pre-analysis to provide a tentative insurance scheme for 500 homes. VINARE* and other financial institutions are also involved in this initiative, and the use of disaster prevention funds to subsidize insurance premium payments is under consideration.

* Vietnam National Reinsurance Corporation.

(2) AXA

AXA is promoting research into the role that insurance companies can play in enhancing urban resilience, and is working with a UN agency to improve building standards in urban areas in developing countries. The following table provides a summary of AXA's initiatives.

Table 1: AXA's Initiatives for Enhancing Urban Resilience

Theme	Summary
Climate change responses by cities and SMEs (2015)	• In cooperation with the United Nations Environment Programme (UNEP), conducted a survey of 1,100 SME executives and local government officials in 18 countries in Europe, the Americas and Asia, including both developed and developing countries. • Local governments in developing countries have a marked tendency to only limitedly recognize the role of the insurance industry. The two parties can do much more by working together to secure disaster recovery funds quickly, and to utilize the expertise of insurance companies in terms of modeling and forecasting climate risks. • Local governments indicated that they expect insurance companies to promote change in the behavior of residents by linking resilience efforts to premiums, and by providing education and support for businesses and residents to help them identify and adapt to risks. • The insurance industry is recognized as a credible source of information about climate risks. Therefore, it may be exposed to reputational risk if it does not reflect resilience efforts in both product design and premiums.

Urban issues and enhancing resilience (2018)	• The AXA Research Fund supports academic research that helps solve urban problems.
	• A report issued in 2018 outlines research conducted with the support of the fund, on urbanization, floods, infrastructure, pollution, infectious diseases, and the protection of vulnerable populations. Examples of research include:
	  • A modeling framework to evaluate global urbanization and its impact, by identifying past, present and future urbanization hotspots, and comprehensively analyzing urban components
	  • A modeling framework for predicting coastal changes due to climate change on a 10km spatial scale
	  • Infrastructure improvement measures based on analysis of urban resident behaviors
	  • A satellite radar to identify structural defects in infrastructure with millimeter precision

Building standard improvements (2016 onward)	• Cooperates with UN-Habitat to formulate recommendations and guidelines to strengthen building standards and techniques in cities, and promote compliance with them in order to reduce human and economic damage caused by natural disasters. • Considers measures to strengthen building standards and techniques based on analysis of disaster damage in urban areas of Indonesia, the Philippines, Pakistan and Haiti.

Sources: AXA, "2016 Integrated Report" (2017.4); AXA & UNEP-FI, "Business Unusual: Why the climate is changing the rules for our cities and SMEs" (2015.11); AXA Research Fund, "AXA Research Guide - Building Resilient Cities" (2018.2)

(3) Swiss Re

Swiss Re is examining and testing measures to enhance resilience through insurance schemes in cooperation with China's central and local governments as well as insurance companies. Many of these measures are built on parametric insurance, in which claim payments are triggered by parameters such as wind speed and rainfall, enabling policyholders (local governments) to quickly obtain funds to respond in the event of a disaster. One of the projects is being implemented in 10 regions of Guangdong Province in partnership with local insurance companies such as the People's Insurance Company (Group) of China. Parametric insurance that provides cover (with a maximum limit of 350 million U.S. dollars) for damage caused by typhoons and heavy rains is designed and provided according to the characteristics of each region. When Shanwei City, a target region of this project, was damaged by Typhoon Haima in 2016, it received insurance compensation within a week of the disaster. Swiss Re is also working to enhance resilience in Dalian City and Heilongjiang Province using insurance schemes.

4. Conclusion

As discussed in this paper, collaboration between insurance companies and local governments has gained momentum in recent years. However, it is still not very common for insurance companies to be involved in resilience strategies of cities from the initial study phase, and it is mainly in European companies that we can see limited, pioneering examples.

Given that rapid urbanization is expected to continue in tandem with worsening urban problems and risks on a global scale, insurance companies can do much more to contribute to enhanced urban resilience by functioning as risk management, underwriting and risk transfer experts, and institutional investors. Collaboration between insurance companies and local governments creates win-win outcomes and can provide insurance companies with direct and potential benefits, including those for business expansion. As such, the current situation, in which much room remains for further cooperation with local governments, provides insurance companies with an excellent business opportunity. For insurance companies to take advantage of this opportunity, it may be worth considering ways to cooperate more effectively with local governments, including fostering common understanding among stakeholders with long-term relationship-building in mind, and identifying and presenting their role in enhancing urban resilience as well as the solutions they can provide.

* A list of reference publications is available on "Japan's Insurance Market" at Toa Re's website:
https://www.toare.co.jp/english/index.htm
* GIIJ Reports (Japanese only) are available on the GIIJ website:
http://www.sonposoken.or.jp/reports/

3. Putting Jebi's Insured Losses in Context: A Look Back at Historic Japan Typhoons

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Editor's Note: The insured loss amounts given in this article include only residential, commercial, mutual, and auto lines of business; they exclude loss adjustment expenses, loss from Miscellaneous (e.g. marine, accident, etc.) demand surge, business interruption, etc. The USD amounts given in this article are based on an exchange rate of JPY 1 = USD 0.0091, current as of May 28, 2019.

1. Foreword

Globally, 2018 was a costly year for catastrophes; the Camp Fire in California topped the list of insured losses last year, followed by Hurricane Michael at number two, and Typhoon Jebi in the number three spot. For the Japanese insurance industry, 2018 was the costliest year for natural disasters since 2011 when the M9.0 Tohoku earthquake (Great East Japan Earthquake) and tsunami struck. Jebi is responsible for most of the insured losses from the five major events to impact Japan in 2018: the Western Japan floods in late June/early July; the M5.5 Osaka earthquake on June 18; the M6.6 Tomakomai earthquake on September 6; and Typhoon Jebi in early September, followed by Typhoon Trami later that month. At the time of this writing, industry estimates for Jebi's insured losses alone hover around 13 billion U.S. dollars.

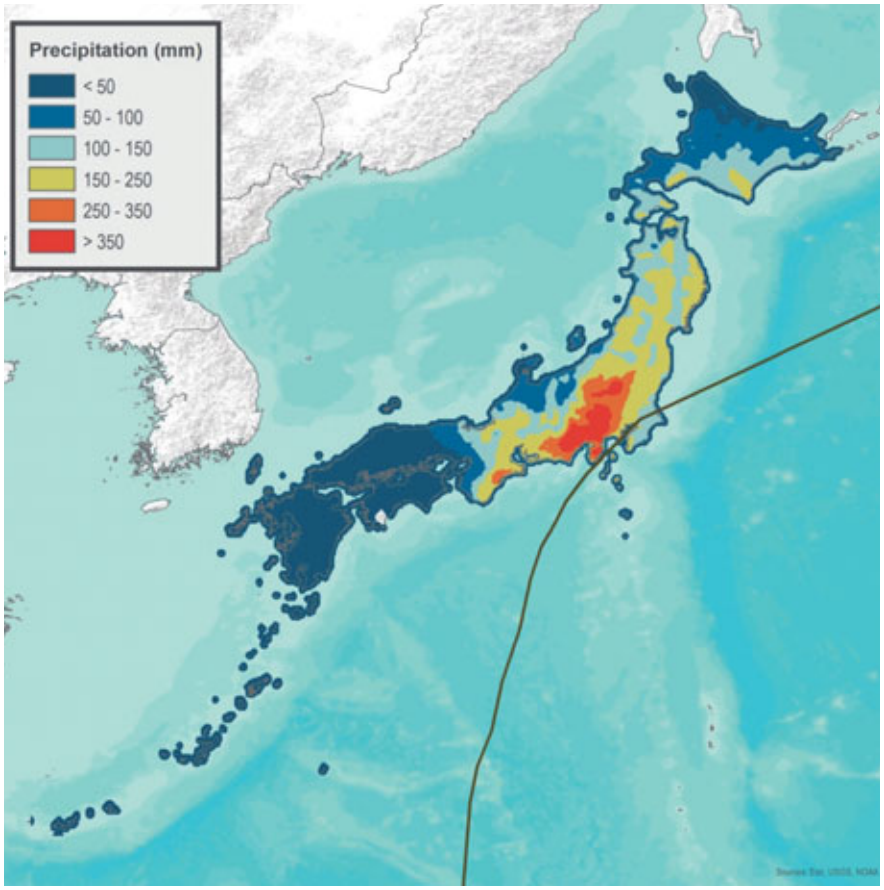
Although Jebi is firmly established as Japan's biggest typhoon-related insurance and reinsurance loss on record, much greater losses are possible. Japan is prone to natural disasters and the decade that followed World War II saw numerous large-scale events, including the Nankai earthquake in 1946, Typhoon Kathleen in 1947, the Fukui earthquake in 1948, Typhoon Ida in 1958, and Typhoon Vera (Isewan Typhoon) in 1959. If Ida or Vera were to recur today, for example, each would result in higher losses than those of Jebi. More recently, Typhoon Mireille in 1991 was Japan's costliest typhoon at the time and if it were to recur today its losses would be of a similar order of magnitude to Jebi's losses. In this article, we take a look back at historic storms—precipitation-dominant (Kathleen, Ida), surge- and wind-dominant (Vera) and wind-dominant like Jebi (Mireille, Bart, Songda)—to understand Jebi's losses in the context of historic Japan typhoon losses.

2. Typhoon Kathleen

On September 15, 1947, Typhoon Kathleen made landfall in Kanagawa Prefecture, just south of Tokyo. One-minute sustained winds at landfall were estimated at 120 km/h—just barely equivalent to a Category 1 hurricane. In Shizuoka Prefecture, south of Kanagawa, one-minute sustained winds exceeding 88 km/h (tropical storm strength) were reported. Having weakened by the time of landfall, wind damage was restricted to towns along the immediate coast.

More extensive, however, was the damage from precipitation-induced flooding from Typhoon Kathleen, which dropped between 300 and 800 mm of rain in the Tone River basin in just two days (Figure 1)—from September 13 to 15—yielding the highest flood discharge ever observed. North and east of Tokyo, several dikes were breached and embankments suffered failures, resulting in severe flooding along the Tone River, particularly in Kurihashi. More than 303,000 buildings were inundated, and 2,000–4,000 people were killed.

Figure 1. Storm track and modelled observed accumulated precipitation totals for Typhoon Kathleen (1947). (Source: AIR)

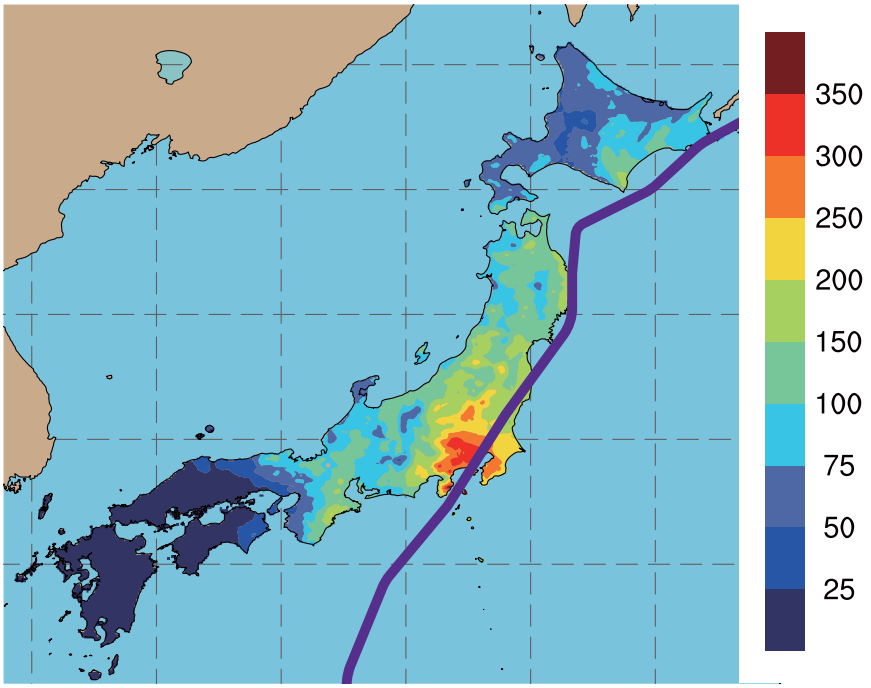


Typhoon Kathleen is still regarded as one of Japan's costliest and most devastating precipitation-induced flood disasters. AIR estimates that if Kathleen were to recur today, insured losses would total approximately 1,294 billion yen (11.8 billion U.S. dollars).

3. Typhoon Ida

On September 26, 1958, Typhoon Ida struck Japan's Kanagawa Prefecture on the island of Honshu. While there was some wind damage, the vast majority of Ida's damage was caused by the deluge of rain from the Izu Peninsula to the capital city of Tokyo and beyond (Figure 2), which led to flooding and mudslides.

Figure 2. Storm track and modelled observed accumulated precipitation totals (mm) for Typhoon Ida. (Source: AIR)



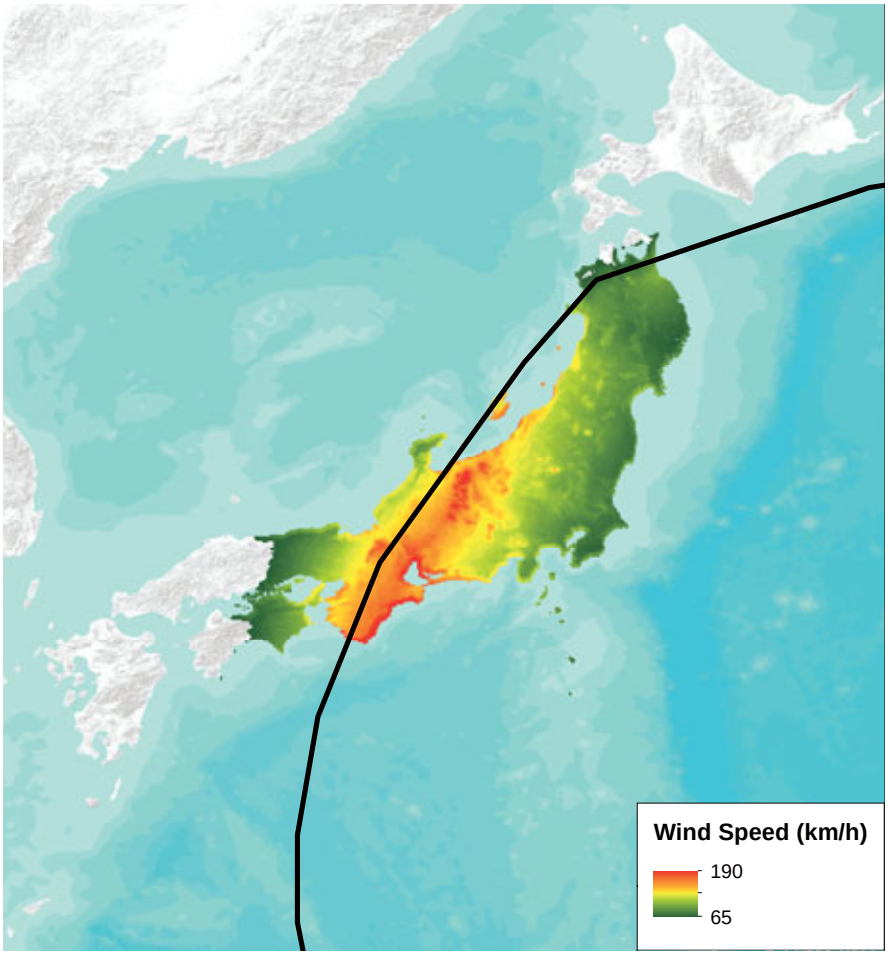
Ida's rains drenched the region during the course of two days, causing several rivers east of Tokyo to burst their banks and flood the suburbs there. Some of the worst destruction and loss of life, however, was along waterways in the western suburbs. Ida's heaviest rains fell west of Tokyo, inundating the headwaters in the mountains and river valleys, triggering flooding and mudslides. The area of the Izu Peninsula around the Kano River (Kanogawa) experienced some of the highest rainfall rates.

AIR estimates if Ida were to recur today, it would result in insured losses of approximately 2,466 billion yen (22.5 billion U.S. dollars). Typhoon Ida remains one of the country's most devastating precipitation-induced flood disasters.

4. Typhoon Vera: Japan's Most Destructive Typhoon and Its Impact on the Insurance Industry

Ida preceded Typhoon Vera—the costliest weather-related disaster in Japan's recorded history—by only one year; a significant portion of the damage was the result of storm surge. On September 26, 1959, a monstrous Category 4 storm with winds near 240 km/h came ashore west of Ise Bay in south-central Japan. The storm was dubbed Vera[1]. Its record-high storm surge crashed over seawalls and breached coastal dikes hundreds of years old. Vera moved northeast over land toward Ise Bay, where its winds drove bay water toward Nagoya Port. The port experienced storm surge of nearly 4 metres at 9:35 p.m. local time. Dikes caved immediately, giving people in Nagoya and surrounding villages little time to flee. The city of Nagoya was devastated in just three hours; its harbor—strewn with bodies, debris, and timber from a local timber factory—was subsequently described as a "sea of dead."

Figure 3. Track and wind speed footprint of Typhoon Vera. (Source: AIR)



Vera tracked quickly across Honshu, losing little strength over land (Figure 3). In the small village of Nagano in central Japan, high winds ripped the roofs from hundreds of traditionally constructed wooden homes. Heavy precipitation swelled rivers so greatly that they spilled over their banks. Landslides were widespread. Conditions remained treacherous even after Vera's departure. Muddy water continued to pour through breaches in dikes on the south-central coast for several days until they were finally repaired. Because the area just north of Ise Bay is at or even below sea level, some districts remained flooded even 100 days after the storm.

Altogether, Typhoon Vera flooded more than 360,000 homes, 190,000 of which were submerged[2] (Oda, 2006). Another 830,000 homes sustained some level of damage. The storm killed an estimated 5,000 people and injured 66,000. Much of the damage was in Aichi and Mie prefectures. AIR estimates if Vera were to recur today, it would result in insured losses of approximately 1,943 billion yen (17.7 billion U.S. dollars), caused mostly by wind (1,819 billion yen, 16.63 billion U.S. dollars).

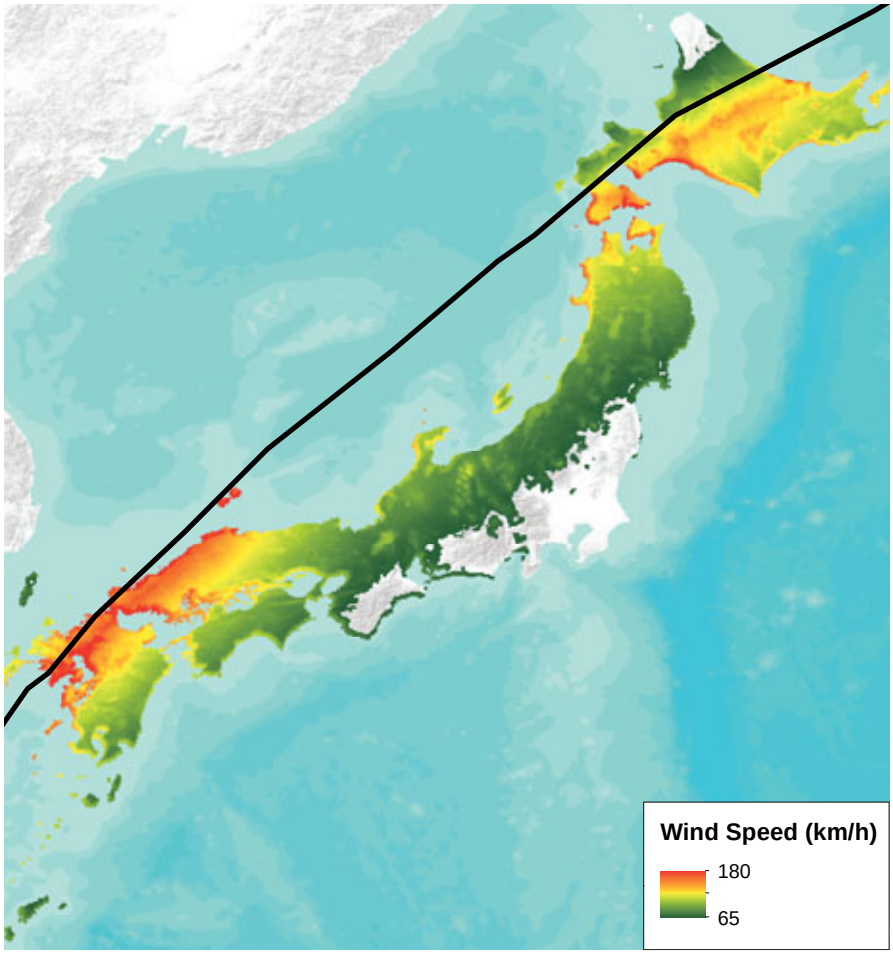
Vera became the event used by insurers and reinsurers to define the reserve for a 70-year return period event. An amendment to the enforcement regulations of the Insurance

Business Law on April 1, 2005, requires insurers to base their catastrophe reserves for windstorm or flood on recurrence of Typhoon Vera[3]. This increases the minimum windstorm return period for reserving and reinsurance purposes from 20 years to 70 years.

5. Typhoon Mireille: Typhoon-Related Insured Loss Record-Setter

Typhoon Mireille whipped across Japan with winds in excess of 160 km/h (Figure 4), causing damage in 41 of Japan's 47 prefectures, destroying more than 170,000 houses and resulting in the largest insured loss claim ever paid for a typhoon-related loss in Japan's modern history. AIR estimates Mireille's recurrence today would result in insured losses of 1,115 billion yen (10.18 billion U.S. dollars), caused mostly by wind (1,040 billion yen, 9.5 billion U.S. dollars). Mireille remained Japan's costliest typhoon for decades, until Jebi.

Figure 4: Track and wind speed footprint of Typhoon Mireille. (Source: AIR)

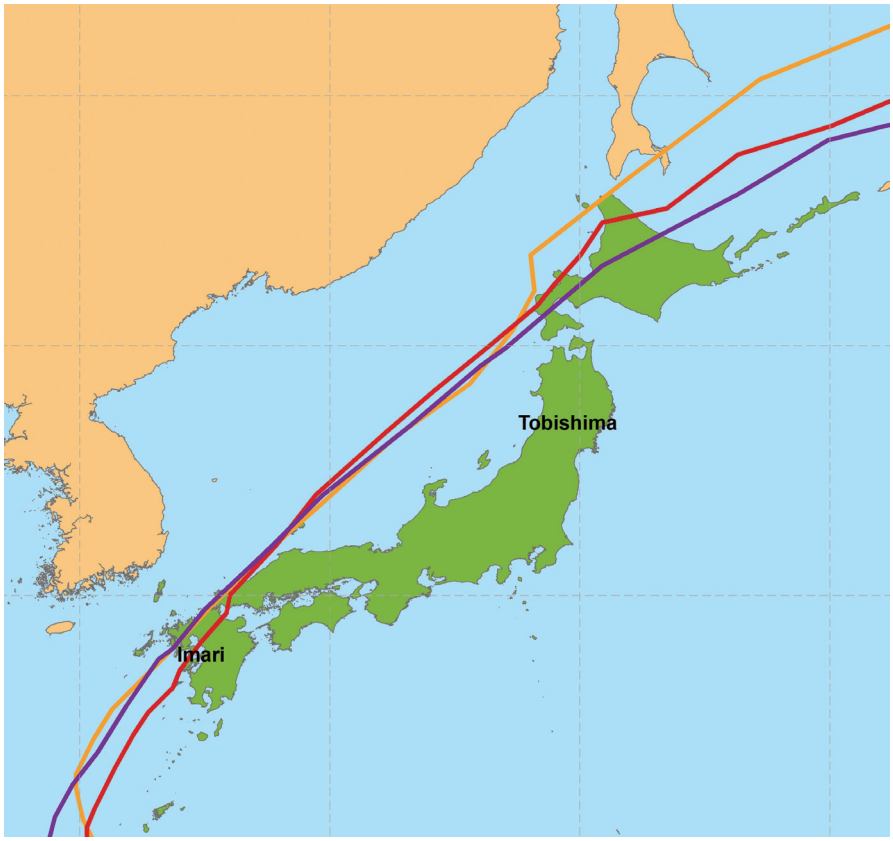


On September 27, when Mireille made landfall in Kyushu's Nagasaki Prefecture, it was the third typhoon of the 1991 season to affect Japan in just two weeks. While interaction with Typhoon Nat may have influenced Mireille's eventual track, it was not the only factor instrumental in Mireille's rise to the top of Japan's insured loss charts.

Mireille took a track typical of other typhoons that have caused major damage on Japanese soil. Furthermore, as is typical, its strongest winds at landfall were on the right, or eastern, side of the storm (which is a result of the combination of counterclockwise rotational winds and forward motion).

Other typhoons that have caused significant wind damage in Kyushu include Typhoon Bart in 1999 and Typhoon Songda in 2004, both of which took paths very similar to Mireille's (Figure 5), but would each cause less in insured losses than Mireille. Bart would cause 675 billion yen (6.17 billion U.S. dollars) if it were to recur, caused mostly by wind (639 billion yen, 5.84 billion U.S. dollars); Songda would cause 778 billion yen (7.11 billion U.S. dollars) in insured losses if it were to recur, also mostly caused by wind (754 billion yen, 6.89 billion U.S. dollars).

Figure 5: Tracks for typhoons Mireille (1991), Bart (1999), and Songda (2004) were very similar. (Source: AIR)

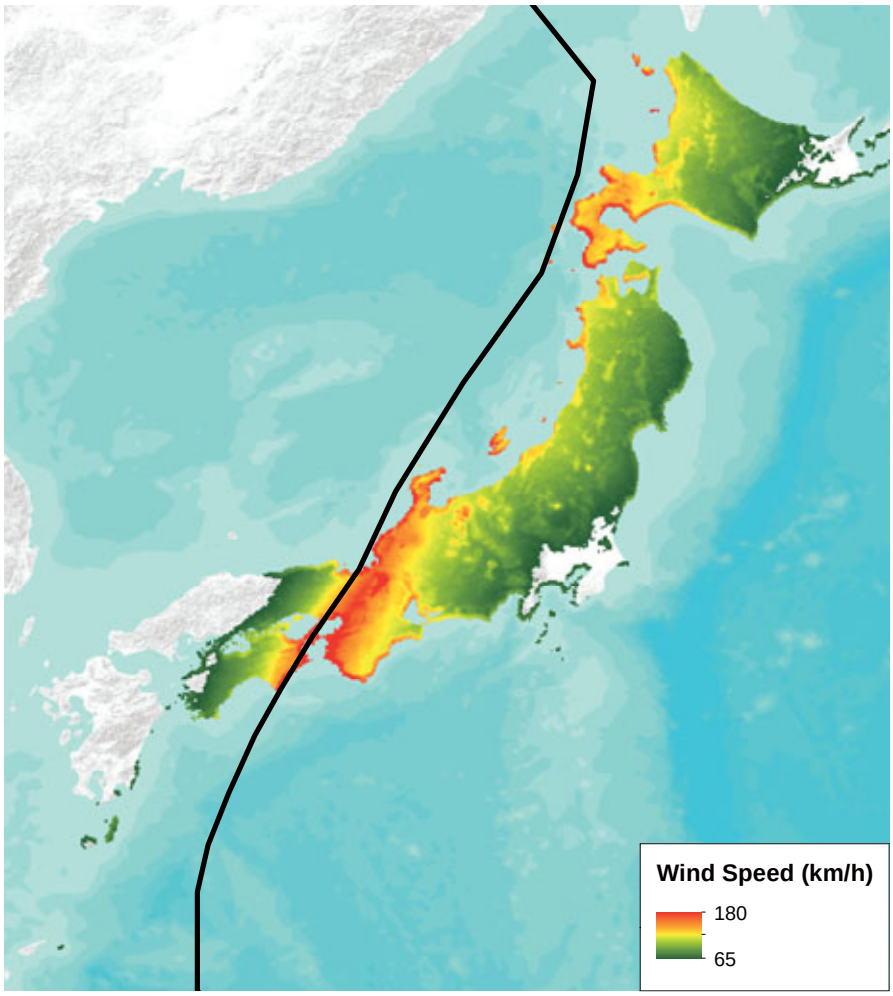


The large losses from Mireille—as compared to those from Songda—were in part a result of Mireille's lower central pressure at landfall (even though both storms exhibited identical central pressure values three hours later, and nearly identical radii of maximum winds). Processes related to extratropical transitioning were also prominently at work in Mireille, much more so than they were in Songda (or in Bart). These processes changed Mireille's wind field, and in doing so, contributed to higher losses.

6. Typhoon Jebi: Managing Japan Typhoon Risk Today

Typhoon Jebi initially struck Shikoku, the smallest of Japan's four main islands, on September 4, 2018. The equivalent of a Saffir-Simpson Category 3 hurricane when it made landfall, Jebi was the most powerful typhoon to hit Japan in 25 years (Figure 6). A second landfall followed near the city of Kobe, 30 km west of Osaka, on neighboring Honshu. Major cities in the Kansai region, among them Osaka, Kyoto, and Kobe, were brought to a halt. The typhoon caused major damage to buildings and infrastructure, seriously impacted shipping and transportation, and led to significant business interruption. While Jebi's insured losses have already set a record, losses would have had more of an impact if insurers were not required to base their reserves on a recurrence of Typhoon Vera.

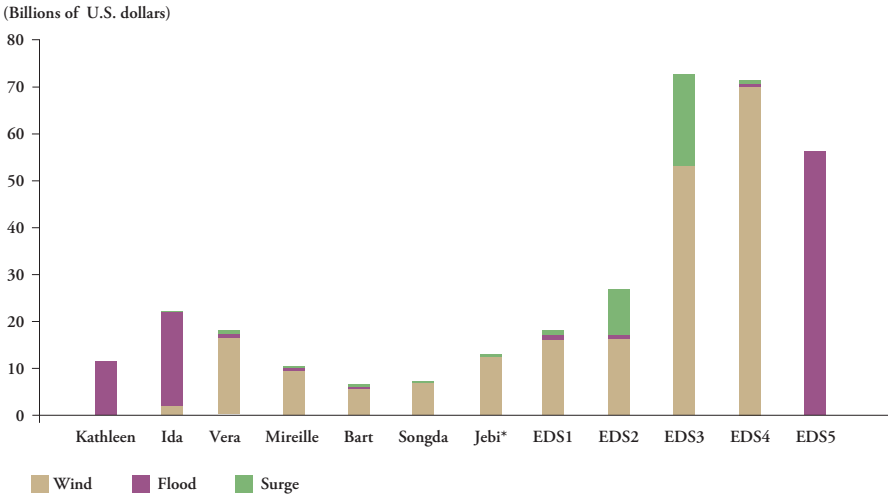
Figure 6: Track and wind speed footprint of Typhoon Jebi. (Source: AIR)



The year 2018 will surely reinforce not just to industry newcomers, but even to those who have spent their careers assessing and managing catastrophe risk, that it is important to prepare for a wide range of scenarios to respond effectively when disaster does strike. Preparing for large losses before they occur by using model scenarios to probe a portfolio's strengths and weaknesses is critical to continued solvency and

resilience. Jebi is not an extreme tail event; far greater losses are possible (Figure 7). The AIR Typhoon Model for Japan includes Extreme Disaster Scenarios (EDS) that represent unlikely, but scientifically plausible, scenarios that cannot be captured by standard stochastic modelling techniques. (Re)insurers can perform detailed loss analyses against these "grey swan events" so that companies can grasp the possible impact on their business.

Figure 7: Modelled insured losses for historic typhoons if they were to recur and 5 modelled insured losses for 5 Extreme Disaster Scenarios (EDS) in the AIR Typhoon Model for Japan.



* Jebi's losses reflect industry estimates as of May 2019.

No catastrophe model can predict what the next natural disaster will actually be or when it will occur. This fundamental uncertainty makes it all the more important for companies to use catastrophe models to prepare for such losses. The full range of scenarios a model can generate—simulating several perils that can impact Japan—provide a unique and important perspective on an organisation's risk. The careful analysis of model results can help risk managers prepare for many contingencies—thus ensuring that another Jebi, for example, will not be entirely unexpected.

Ultimately, catastrophe models—such as the AIR Typhoon Model for Japan, one of a suite of AIR models for Japan—help organisations evaluate the full range of potential events so that they can manage the risk effectively.

1. The Japan Meteorological Agency, which assigns numbers rather than names to typhoons, made an exception in this case after the fact, calling it the Isewan Typhoon because of its destruction of the Ise Bay (wan) region.
2. Submersion indicates flooding to the first floor level.
3. Privatization of the Japanese insurance market didn't happen until 1996; regulating catastrophe reserves was not a priority until nine years later, in 2005, the year after 10 typhoons—more than twice the annual average—made landfall in Japan.

4. Trends in Japan's Non-Life Insurance Industry

Underwriting & Planning Department
The Toa Reinsurance Company, Limited

1. The Operating Environment of the Non-Life Insurance Industry

The GDP of Japan ranks third in the world and its economy has continued to grow moderately in recent years. According to the Japanese government's economic outlook announced by the Cabinet Office, the real GDP growth rate in fiscal 2018 was 0.9% despite the impact of a series of natural disasters during the 2018 summer, and the rate in fiscal 2019 is forecast to be around 1.3%.

Looking at the Japanese non-life insurance market, new advances in automated driving technology are projected to result in a reduction in automobile insurance sales volume; this in a market environment in which automobile insurance currently accounts for about half of net premium income of direct non-life insurance companies. This is just one of the challenges likely to impact market growth.

Under these circumstances, non-life insurance companies in Japan are developing markets by providing new products and services aligned with changing customer needs and implementing initiatives to increase operating efficiency to achieve sustainable growth.

2. Overview of the Non-Life Insurance Industry

(1) Status of Non-Life Insurance Companies and Cooperatives

Japan's non-life insurance industry comprises 27* Japanese non-life insurance companies that are members of the General Insurance Association of Japan (GIAJ) and 19 companies that are members of the Foreign Non-Life Insurance Association of Japan, Inc. (FNLIA). Through an analysis of the financial statements of member companies, it is evident that Japan's non-life insurance market is an oligopoly in which the three largest non-life insurance groups (MS&AD Insurance Group Holdings, Inc., Sompo Holdings, Inc. and Tokio Marine Holdings, Inc.) account for 87% of net premium income written by the 27 GIAJ members as a whole.

* As at March 31, 2019. The current members of GIAJ are 27, as 1 additional non-life insurer joined the GIAJ from April 1, 2019.

Japan's non-life insurance companies have increased operating efficiency since liberalization in 1996, and have conducted numerous mergers and business integrations since 2000. As a result, for all non-life companies, the underwriting expense ratio (other than commission and brokerage) in fiscal 2018 decreased to 15%, compared with 21% for all non-life insurance companies in the industry for fiscal 1995, prior to liberalization.

Major business integrations among Japanese non-life insurance companies in 2018 are as follows.

AIG Group's AIU Insurance Company, Ltd. and The Fuji Fire and Marine Insurance Co., Ltd. established a new company, AIG General Insurance Co., Ltd., in January 2018 through a merger. This new organization can leverage the strengths of the two companies, which are rooted in the Japanese market.

In addition to the above, Rakuten, Inc. made The Asahi Fire & Marine Insurance Company, Limited a wholly owned subsidiary in April 2018, and changed its name to Rakuten General Insurance Co., Ltd. in July 2018. Rakuten operates in a wide variety of businesses via the Internet, with a focus on e-commerce. Rakuten is

targeting growth through means such as expanding its lineup of insurance products that are highly compatible with Internet services and entering alliances with other companies.

The cooperative market is another area of note, as it has a presence that is second only to the non-life insurance market in terms of premium volume. Even if we look only at the main cooperatives that make up the Japan Cooperative Insurance Association Incorporated, they alone had premium income of 2,894 billion yen in fiscal 2017 (excluding life cooperatives and pension cooperatives).

Furthermore, the small-amount, short-term insurance business was introduced in Japan following an amendment to the Insurance Business Act in April 2006. As the name implies, this business is limited mainly to selling insurance in small amounts with limited terms. On the other hand, regulations now make it possible for companies that are not insurance companies to enter this business, much more easily than in the case of establishing an insurance company. For example, companies need only register and do not require a license to operate, the minimum capital required is 10 million yen compared to 1 billion yen for an insurance company, and participants may sell both life and non-life insurance. The number of member companies of The Small Amount & Short Term Insurance Association of Japan continues to grow and the scale of the market continues to expand. Non-life insurance products sold in this market are mainly household insurance, including fire insurance for home contents and renters' liability insurance sold through the real estate agent channel, pet insurance, as well as products to cover other types of expenses.

The Small Amount & Short Term Insurance Market Data

Figure 1: Member Companies

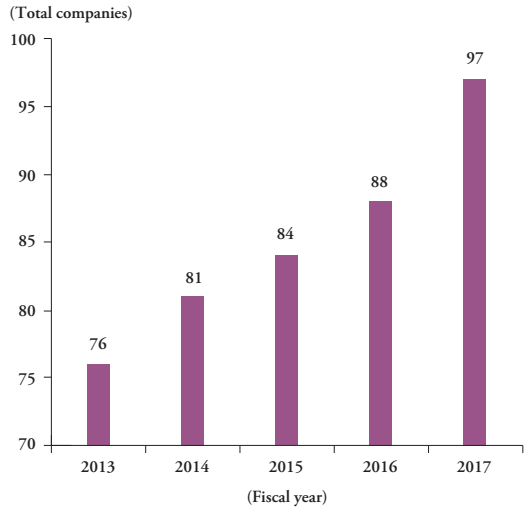
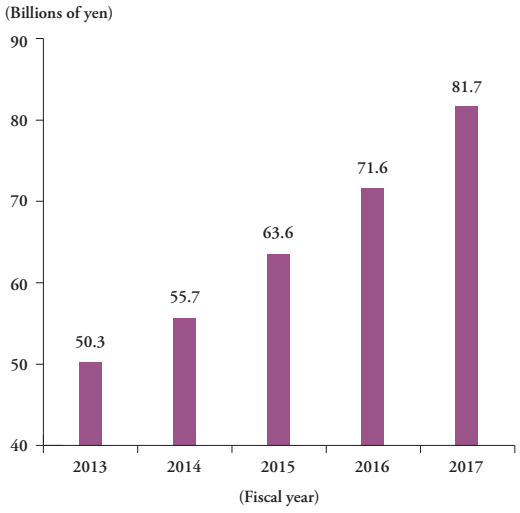


Figure 2: Premium Income (excl. Life and Medical Insurance)



Source: The Small Amount & Short Term Insurance Association of Japan

(2) Natural Disasters in Fiscal 2018

Japan suffered from many natural disasters in 2018. In particular, wind and flood disasters caused extensive damage, with wind and flood claims paid projected to total the largest single-year loss ever. Details of the major wind and flooding disasters in Japan in fiscal 2018 are as follows:

Table 1: Major Wind and Flooding Disasters in Japan in Fiscal 2018

	Heavy Rain in Western Japan (Typhoon No. 7)		Typhoon No. 21 (Jebi)		Typhoon No. 24 (Trami)		(Reference)*** 1991 Typhoon No. 19 (Mireille)	
Date of loss*	July 2018		September 4, 2018		September 30, 2018		September 25–28, 1991	
Central pressure at landfall*	—		950hpa		960hpa		940hpa	
Numbers of insured automobiles and policies**	Motor	25,110	Motor	113,915	Motor	29,322	Motor	108,802
	Fire	24,146	Fire	718,862	Fire	370,968	Fire	484,695
	Misc.	6,064	Misc.	20,811	Misc.	12,417	Misc.	12,568
			Marine	3,696			Marine	1,259
	Total	55,320	Total	857,284	Total	412,707	Total	607,324
Total amount of claims paid (Millions of yen)**	Motor	28,307	Motor	77,981	Motor	11,459	Motor	26,938
	Fire	151,991	Fire	920,227	Fire	285,595	Fire	497,486
	Misc.	15,297	Misc.	16,069	Misc.	9,037	Misc.	25,053
			Marine	53,528			Marine	18,483
	Total	195,595	Total	1,067,806	Total	306,091	Total	567,960

* Source: FDMA (Fire and Disaster Management Agency)

** Source: GIAJ (The General Insurance Association of Japan) as at the end of March 2019

*** The typhoon resulting in the largest amount of claims paid until fiscal 2017

Claims paid due to Typhoon Jebi were particularly large, and to date are the largest ever in Japan, exceeding the 568 billion yen in claims paid due to Typhoon Mireille in 1991, formerly the largest. Of note, claims paid due to Typhoon Mireille are estimated at about 1 trillion yen when adjusted to the current amount of fire insurance.

One reason for the large increase in claims paid for Typhoon Jebi is that the amount paid per claim is higher than in the past. Based on an estimate using data from GIAJ, the amount paid per claim for Typhoon Jebi was approximately 1.3 million yen, significantly higher than the average of 0.7 to 0.8 million yen for past typhoons. One reason is that about half the claims paid for Typhoon Jebi were in urban areas of Osaka Prefecture.

Japan's non-life insurance companies have dealt with this series of natural disasters by improving their system for claims handling, and introducing new rapid response initiatives including the use of smartphones and tablets for remote assessment of claims, the use of drones to survey damage and the use of robotic process automation (RPA).

(3) Trends in Business Results of Non-Life Insurance Companies for Fiscal 2018

Japan's non-life insurance companies utilized reinsurance coverage and reversed catastrophe loss reserves to generate stable earnings in fiscal 2018 despite the many natural disasters mentioned above. The following is a summary of the main financial results (total) of the 26 non-life GIAJ members in fiscal 2018.

Net premium income in all lines of business increased 12 billion yen from the previous fiscal year to 8,393 billion yen.

Net claims paid (paid basis) increased by 622 billion yen to 5,324 billion yen due to the impact of typhoons and other natural disasters in Japan. As a result, the loss ratio for fiscal 2018 increased by 7.6 percentage points to 69.1%.

Expenses decreased by 10 billion yen to 2,725 billion yen. The net expense ratio decreased 0.1 percentage points to 32.5%.

Underwriting profit (earned/incurred basis) decreased by 87 billion yen to 193 billion yen. Ordinary profits, calculated as the sum of underwriting profit and investment profit, increased by 52 billion yen to 864 billion yen. After deducting tax expense, net income decreased by 2 billion yen to 676 billion yen.

Consolidated net premium income reflected the increase on a non-consolidated basis. Japan's non-life insurance groups utilized reinsurance coverage and reversed catastrophe loss reserves to cover the impact of natural disasters in Japan during fiscal 2018, and the significant impact from hurricanes in the previous fiscal year did not recur. Ordinary profits therefore increased year on year.

3. Recent Non-Life Insurance Industry Trends

(1) New Product Development

(a) Cyber Insurance

Companies have had to deal with major changes in their operating environment over the past several years because of the frequent occurrence of large-scale leakage of personal information and the risks posed by simultaneous cyberattacks such as those from WannaCry and NotPetya.

Under these circumstances, in addition to providing cyber insurance, Japan's major non-life insurance companies have also expanded support services for potential clients including consultation for cyber security, such as information security diagnostic services and drills for combating targeted e-mail cyberattacks.

It is said that cyberattacks on Japan will continue to increase because of the upcoming 2020 Tokyo Olympics and Paralympics. Insurance companies have partnered with cyber security companies to provide a variety of additional services.

Non-life insurance companies are also developing enhanced coverage for cyber risks that are becoming increasingly complex and sophisticated.

(b) Sharing Economy

The sharing economy market is rapidly expanding in the United States and Europe, and is expected to expand in Japan as well. Services from U.S companies such as Airbnb and Uber are now available in Japan, and sharing economy services developed in Japan are gaining in popularity.

The size of the car sharing market is expanding due to the increase in the number of vehicles and car stations, and corporate use is also increasing. The share cycle is also rapidly being introduced in local governments.

Barter, recycling and fashion rental services have also launched recently, allowing people to enjoy various fashions without having to take care of cleaning.

Given these circumstances, Japan's non-life insurance companies see the changing social environment in which the sharing economy is gaining traction as a business opportunity, and are partnering with related organizations to contribute to the development of a sustainable industry. Their efforts to develop and market new insurance products to address the sharing economy have attracted attention.

Regarding inbound visitors to Japan, insurance companies are developing new products and providing new services to capture demand. Examples include the development of multilingual insurance products that bundle coverage for risks associated with short-term rental of private residences.

It is expected that the non-life insurance industry will be able to cope appropriately with the evolving risks in the sharing economy market as it expands further.

(2) Innovation

The insurance industry has embraced the term "InsurTech" to refer to the fusion of insurance and information technology and to encourage innovation in non-life insurance products and the operations of non-life insurance companies.

Artificial intelligence (AI) has been used to improve the quality of customer service, such as employing voice recognition of customer inquiries at call centers and displaying candidate responses on the computer screens of operators. In recent years, non-life insurance companies have been introducing AI in other areas as well. Damage assessment is one example. Initiatives are underway to automate insurance claim calculation and for the allocation of fault for automobile accidents through AI analysis of images taken with smartphones and drive cams. AI is also being used in insurance underwriting to analyze corporate creditworthiness based on financial information, and initiatives to automate screening for credit guarantee insurance underwriting are under way. Progress among non-life insurance companies in deploying AI in their operations will support improved customer satisfaction by increasing speed and efficiency, and enhancing objectivity and rationality in customer services.

Companies are also applying blockchain (distributed ledger) technology to insurance policies. Several non-life insurance companies also got together in a consortium to apply blockchain technology to trade operations in 2017, and some companies conducted demonstration tests independently. The actual application of blockchain technology to insurance policies is expected to optimize business processes, which will dramatically accelerate procedures and improve the quality of the services that non-life insurance companies provide by enhancing security.

Automobile manufacturers and non-life insurance companies alike are participating in the development of vehicles with automated driving technology. Insurance companies are selling insurance that covers risks related to automated driving demonstration tests, and are providing driving data collected using the Internet of Things (IoT) and their historical claims records of past accidents, along with expertise in accident risk prevention and damage mitigation enabled by these data. In addition, they are providing products for risks associated with automated driving technology, including endorsements for accident victims of automated driving in cases where the driver responsibility of the automated vehicle cannot be verified immediately. In this way, non-life insurance companies are contributing to the development of automated driving technology, while working to ensure that society is secure and safe by developing products that support the increasing prevalence of automated driving.

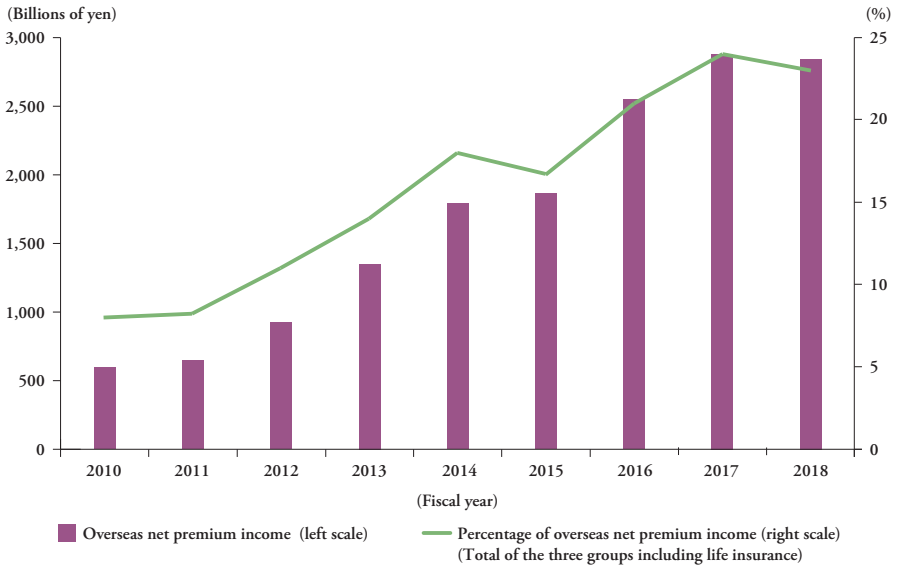
(3) Expansion of Overseas Business

The three largest non-life insurance groups have all positioned overseas business as a growth driver, and have aggressively implemented initiatives such as forming business alliances with local insurance companies and engaging in M&A.

Figure 3 shows that overseas net premium income* for the three largest non-life insurance groups has been trending upward. Overseas net premium income for these insurance groups in fiscal 2018 was about 5 times that of fiscal 2010, and overseas business accounted for approximately 23% of net premium income for the three largest non-life insurance groups.

* In this section, "overseas net premium income" shows the total of net premium income from non-life insurance and life insurance premiums.

Figure 3: Trends in Overseas Net Premium Income for the Three Largest Non-Life Insurance Groups



Source: Calculated by Toa Re using data compiled from the financial results of each of the three groups

Key overseas business developments of the three largest non-life insurance groups and recent trends are as follows:

MS&AD Holdings is concentrating on Asian business and the reinsurance business. Mitsui Sumitomo Insurance acquired the general insurance operations in Asia of U.K. company Aviva plc in 2004, and is using it as its base for advancing into the ASEAN region. For Asian business, it also enhanced its presence by acquiring Singapore insurer First Capital Insurance Limited in December 2017. Regarding the reinsurance sector, it strengthened business in 2016 by completing the acquisition of Amlin plc of the United Kingdom.

Sompo Holdings acquired leading U.K. specialty (re)insurer Canopius Group Limited in May 2014. In addition, it significantly expanded its overseas business in 2017 by completing the acquisition of Endurance Specialty Holdings Ltd. (now called Sompo International). Also in 2017, Sompo Holdings restructured its overseas business, making Sompo International the core overseas insurance business of the group, and selling all Canopius shares to a private equity investor.

Tokio Marine Holdings has developed its overseas operations particularly in Europe and the United States. It acquired U.K. company Kiln Ltd. and U.S. company Philadelphia Consolidated Holding Corp. in 2008, then acquired U.S. company Delphi Financial Group, Inc. in 2012. Moreover, in October 2015 it acquired U.S. specialty insurer HCC Insurance Holdings, Inc. to further grow its overseas insurance business through diversification and to improve capital efficiency. At the same time, Tokio Marine Holdings sold its reinsurance subsidiaries (Tokio Millennium Re AG and Tokio Millennium Re (UK)) in 2018 and reviewed its business portfolio.

(4) Trends in Regulation by Regulatory Agencies

The Financial Services Agency (FSA) considers introducing evaluation and supervision methods based on economic value in parallel with the Insurance Capital Standard (ICS) by the International Association of Insurance Supervisors (IAIS). Economic value-based solvency evaluation will come into force in line with the ICS application schedule (to be introduced as a full-fledged regulation after a 5-year monitoring period in fiscal 2025).

The FSA has noted that introducing the economic solvency ratio into the regulatory regime may bring unexpected consequences, such as excessively risk-averse behavior among insurance companies. Therefore, it is investigating unintended consequences and international trends while continuing its examination with emphasis on dialogue with relevant parties.

The FSA recognizes that it needs to continuously improve the quality of its financial administration as an organization that always anticipates upcoming issues and transforms itself to meet the expectations of the people of Japan and earn their trust, and to keep up with the rapid pace of finance-related changes. It is implementing a number of initiatives aimed at achieving this objective. These wide-ranging initiatives include changes in organizational culture and governance. The major organizational changes that the FSA implemented in 2018 are representative. In the past, units responsible for on-site inspection were separate from units responsible for off-site supervision, but they are now integrated in a single organization for on-site and off-site monitoring to make the ongoing dialogue with financial institutions more effective and efficient. The FSA will continue to regularly review inspection and supervision structures and procedures to ensure quality, circumspect monitoring and appropriate regulatory actions.

5. Trends in Japan's Life Insurance Industry

Life Underwriting & Planning Department
The Toa Reinsurance Company, Limited

1. Overview of Business Results for Fiscal 2018

The fiscal 2018 business results for 41 life insurance companies are as follows:

(1) Total Amount of New Business

During the fiscal year ended March 31, 2019 (fiscal 2018), the total insured amount of new business for individual life increased by 16.4% to 66.7 trillion yen. The total insured amount of new business for individual annuity insurance increased by 10.4% to 5.3 trillion yen. On the other hand, the total insured amount of new business for group insurance decreased by 4.4% to 4.7 trillion yen.

(2) Total Amount of In-force Business

The total insured amount of in-force business for individual life decreased by 0.5% year-on-year to 848.7 trillion yen, which was essentially unchanged from the previous fiscal year despite an increase in the total insured amount of new business. Similar to the trend of total insured amount of new business for individual insurance, the total insured amount of in-force business for individual annuity insurance decreased by 1.1% to 104.4 trillion yen. On the other hand, the total insured amount of in-force business for group insurance increased by 2.1% to 391.7 trillion yen.

(3) Premium Revenues and Total Assets

Total premium revenues increased by 4.2% year-on-year to 35.2 trillion yen. Similar to the previous fiscal year, total assets increased by 1.7% to 387.6 trillion yen due to the increase in foreign securities.

2. Trends in the Life Insurance Industry

The Use of InsurTech

The life insurance industry is increasingly using so-called "InsurTech," which refers to a range of technologies such as artificial intelligence (AI) and robotic process automation (RPA). Several factors, including technological developments, are considered reasons for the spread of InsurTech, but one overarching factor is the working population shortage resulting from the declining birthrate and aging population. Japan's working population (aged from 15 to 64), which was 86.22 million in 2000, is currently down by approximately 12.5% to 75.42 million and is expected to continue declining. InsurTech is expected to be a means to solve labor shortage problems.

InsurTech was initially put to use in limited areas such as claims assessment and clerical procedures. For example, the conventional claims assessment procedure places a significant burden on employees because it requires identification of misstatements and the like, and judgment may vary due to individual discretion. With AI technology, however, a claims analyst can easily access similar cases from claims payment records and make assessment decisions based on examples from those records. Based on the information provided by AI, even relatively inexperienced claims analysts can make payment decisions accurately and quickly, which improves operating efficiency and quality.

Until recently, the use of InsurTech had been limited to the back office as mentioned above, but its use for sales support has now begun. For example, since April 2019 Nippon Life Insurance Company (hereinafter referred to as "Nippon Life") has been using InsurTech to collect useful information for sales activities. One example is the use of IBM's Watson Explorer and API services to access topics and articles from a database of customers and their insurance policy information. This enables Nippon Life to draw out information that is optimally aligned with customer needs. In addition, Nippon Life has begun offering a free training service on the subject of preventing dementia. Available to the general public as well as policyholders, it is structured as a quiz delivered by an AI speaker, but moderated by a medical specialist.

Insurance companies are using these and other initiatives to maintain and capture share in the shrinking domestic market by increasing points of contact with agents and customers.

With the use of InsurTech likely to increase, attention is now focused on how insurance companies deploy it to enhance productivity and deliver greater added value.

3. Regulatory Trends

Suspended Sales of Increasing Term Life Insurance for Executives

In February 2019, the Financial Services Agency (FSA) stated that some increasing term life insurance products for executives might deviate from the primary objective of insurance, and as such were cause for concern. In response, some life insurance companies stopped selling increasing term life insurance products for executives. Increasing term life insurance products were sold by about half of Japanese life insurance companies. Sales in fiscal 2017 totaled between 800 billion yen and 900 billion yen, about 30% of annualized premiums from new individual insurance policies and annuities in the Japan market.

Increasing term life insurance products have three main characteristics: 1) their ability to take full advantage of the tax benefits of corporate policies, 2) their ability to maximize cash value, and 3) their ability to generate high commissions for salespeople/agencies.

In terms of the way taxes are calculated in Japan, companies can add up the premium costs of corporate policies to the full amount in accordance with the type of insurance product. Increasing term life insurance products were designed to take full advantage of such tax benefits.

In addition, these products are designed to maximize cash value. Cash value can be maximized through the accumulation of large amounts of premium reserve during the early stage of the policy by suppressing the death benefit during that stage and raising it at a later stage. In recent years, a large volume of these products have been introduced, emphasizing this feature (limiting claims payment during the early stage only to the accident death benefit) to the fullest extent.

Increasing term life insurance products generate high commissions for salespeople/agencies against the backdrop that companies are free to set loading premiums (this process was not included in the FSA's list of items requiring approval

in new product development in 2006). The original intent of the FSA was to promote competition among insurance companies and reduce these premiums – as such this item was not included on the list of items requiring approval. However, this had the opposite effect on increasing term life insurance products because companies set extremely high loading premiums to enhance the incentive for salespeople/agencies to sell these products.

Under these circumstances, the FSA expressed concern that some increasing term life insurance products had unnaturally high premiums and high surrender value and lacked rationality and relevance as insurance products, and asked companies to revise the product design if the products were so. At the same time, the National Tax Agency also expressed concern, and suggested that they would revise tax rules. If the tax rules are revised, companies will only be able to take full advantage of the tax benefits of corporate policies if the designated surrender value rate falls within a certain range.

Various types of insurance products with tax benefits have been developed, not only increasing term life insurance products. The relevant authorities have always tightened regulations on products that go too far, so it would seem to be a game of cat and mouse.

Given the challenging market conditions caused by the low birth rate, aging society and the government's protracted low-interest policy, suspending sales of a popular product is without doubt a major blow to the life insurance market. Attention is now focused on how life insurance companies will fill the void.

4. Product Trends

(1) Insurance Products with Wellness Benefits

Life insurance companies are developing new insurance products to stimulate new consumer needs. Among them, insurance products with so-called "wellness benefits," which give policyholders incentives such as premium discounts for being healthy, have drawn attention.

Increasing longevity in Japan is a reason for interest in these products. In fact, in the revision of the standard mortality table in April 2018, the mortality rate was reduced due to an increase in average life expectancy and mortality improvement.

In addition, increased longevity leads to an increase in overall healthcare expenses. Healthcare expenses for elderly people aged 65 and over are expected to be 1.5 times higher in 2025 than they were in 2015. This market environment suggests that insurance products for long and healthy life will be in greater demand than ever before.

Several companies already sell insurance products with wellness benefits, and the product lineup is diverse. In December 2016, The Neo First Life Company, Limited, a subsidiary of Dai-ichi Life Holdings, Inc., was first in the industry to launch a product that uses "health age," calculated using data including body mass index (BMI), blood pressure, urine tests, and blood tests, instead of "real age" to calculate the premium at renewal. Subsequently, Sompo Japan Nipponkoa Himawari Life Insurance, Inc. (from October 2019 the name will change to Sompo Himawari Life Insurance Inc., hereinafter referred to as "Himawari Life") launched

a product that, in the case of improved health, provides the policyholder with a rebate, which is equivalent to the difference between the paid premium and the premium calculated retroactively to the policy inception date.

The ways in which products in this category provide incentives are not limited to the review of premiums according to health condition as described above. For example, The Dai-ichi Life Insurance Company, Limited (hereinafter referred to as "Dai-ichi Life") launched a new rider that reduces premiums simply with the submission of a health certificate. This rider can be attached to products that were sold in March 2018, and thereafter. The development of this rider was based on an analysis of medical big data, which shows a significantly lower incidence of death or the incidence of three major illnesses among people who get medical checkups compared to those who do not. Dai-ichi Life has sold more than one million insurance policies since March 2018, and about 80% of them have this rider attached.

More insurance companies are expected to analyze their own big data to develop insurance products with wellness benefits. However, this is a new product category, so companies need to scrutinize it closely to determine whether it will become a mainstream of the market and if the products can achieve their intended results.

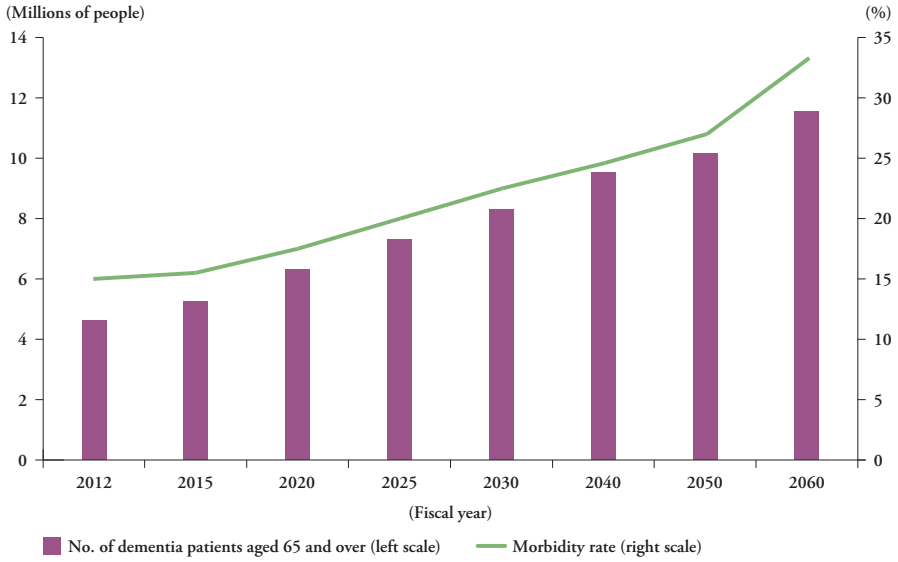
(2) Expanded Sales of Dementia Insurance

In recent years, sales of dementia insurance have grown in the Japan market. In 2016, Taiyo Life Insurance Company (hereinafter referred to as "Taiyo Life") and Asahi Mutual Life Insurance Company (hereinafter referred to as "Asahi Life") launched this type of product ahead of other companies, and sales have been solid. Since then, other companies have also started selling these products. This trend is against a backdrop of the aging of Japan and the rising number of dementia patients. The number of dementia patients aged 65 or older was 4.62 million in 2012, and is expected to reach 7.30 million in 2025, accounting for about one in five people aged 65 or older. As a result, the medical and long-term care expenses for patients with dementia will increasingly have a negative impact on family finances.

In March 2016, Taiyo Life was the first in the industry to launch a simplified issue insurance product that pays a lump sum if the insured is diagnosed with "organic dementia," a type of dementia caused by changes in brain tissue, and the condition continues for 180 days. This dementia coverage is also available to people who have been hospitalized in the past or feel anxiety about their health, because it is a simplified issue insurance product. In April 2016, Asahi Life launched a dementia insurance product with benefits linked to the standards stipulated by the public nursing care insurance system. Asahi Life had already launched a similar product for nursing care in 2012; then began selling dementia coverage as need increased.

Other companies followed by introducing their own products with specialized coverage for dementia. A recent feature is the provision of services to support the prevention and early detection of dementia. In October 2018, Himawari Life launched dementia insurance that was the first in the industry to cover mild cognitive impairment (MCI), which is the stage that precedes dementia. In the same

Figure 1: Estimated No. of Dementia Patients Aged 65 and Over and Estimated Morbidity Rate



month, Taiyo Life launched a new dementia insurance product that provides benefits for prevention every two years after the first year. The benefits can be paid for dementia prevention services such as those related to MCI testing costs and physical therapy sessions that are effective for disease prevention and health promotion. In addition, one of the features of the dementia insurance products launched by Dai-ichi Life in December 2018 is that they cover services for prevention and early detection. These services include a smartphone application that can check cognitive functions using eye movements, and home visits by security personnel to confirm safety in an emergency. Furthermore, in the non-life insurance market, Tokio Marine & Nichido Fire Insurance Co., Ltd. launched an insurance product for patients with dementia in October 2018. This product covers search expenses and personal liability for dementia patients.

The number of patients with dementia is expected to increase, so the need for dementia insurance is also expected to increase. Future dementia insurance trends are of interest because dementia products are becoming more diverse in ways such as offering support for prevention and early detection in addition to covering treatment and long-term care costs.

(3) Outlook for Highly Tontine Annuity Insurance

Post-retirement funding needs continue to grow in Japan, where longevity is still increasing, although average life expectancy is already the highest in the world. The life insurance industry is therefore focusing on highly tontine annuity insurance (highly tontine annuity insurance is an annuity product to be designed to ensure larger annuity fund by suppressing death benefit and surrender value.)

The debate about the sale of annuity insurance with highly tontine features has

been going on for a long time, and the authorities have always taken a cautious stance. However, sales of this type of annuity product have recently been permitted against the backdrop of the attention they have drawn in recognition of the fact that the public pension system, which has been central to post-retirement pensions, will not be fully able to fulfill its responsibilities to retirees due to factors including the declining birth rate, the aging of society, and the protracted low interest rate environment.

Annuity insurance products with a low surrender value, such as the "Gran Age" product that Nippon Life launched in April 2016, suppress surrender value to 70% at most. These products further enhance the savings function by not attaching death benefits.

These types of product effectively cover longevity risk because they are whole life annuity (in some products, fixed-term annuity); meanwhile, they provide surrender values that are less than the paid premiums in the case of midterm cancellation, and benefits exceed paid premiums when policyholders are in their late 80s.

The reason for the increasing sales of this type of product, which carries the high risk of principal loss, is strong need driven by anxiety about the public annuity system. Consumers will remain interested in products covering longevity risk such as annuity insurance with highly tontine, and attention is focused on products that may emerge in the future.

Company Overview

Profile

The Toa Reinsurance Company, Limited (Toa Re), was established in 1940. With the reinsurance market evolving and clients' needs expanding, we have recognized the importance of being able to provide a diverse line of life and non-life reinsurance products to lead the market as Japan's primary professional reinsurer. Toa Re is based in Tokyo with subsidiaries in New Jersey (U.S.A.), Zürich (Switzerland) and London (U.K.). Increasing demand for reinsurance products in Asian countries prompted us to expand our operations in those regions and establish branch offices in Singapore, Kuala Lumpur and Hong Kong.

In acknowledgment of Toa Re's outstanding financial profile, credit rating agencies, Standard & Poor's Financial Services LLC, A.M. Best Company, Inc. and Japan Credit Rating Agency, Ltd., have assigned Toa Re ratings of A+, A and AA+, respectively. As of March 31, 2019, the Toa Re Group boasted total assets of 694.0 billion yen. Net premiums written during the fiscal year ended March 31, 2019, totaled 248.2 billion yen.

Mission Statement

ToaRe Mission Statement

Providing Peace of Mind

Toa Re aims to realize its mission by

working with society and applying the principles of fairness and integrity to all aspects of our business

offering long-term, solid support to our clients by supplying reinsurance products and services that enable them to maintain stable operations

striving to further the interests of our shareholders and keeping them fully informed at all times

respecting the creativity of our employees and valuing their contributions

conserving the environment and contributing to the community

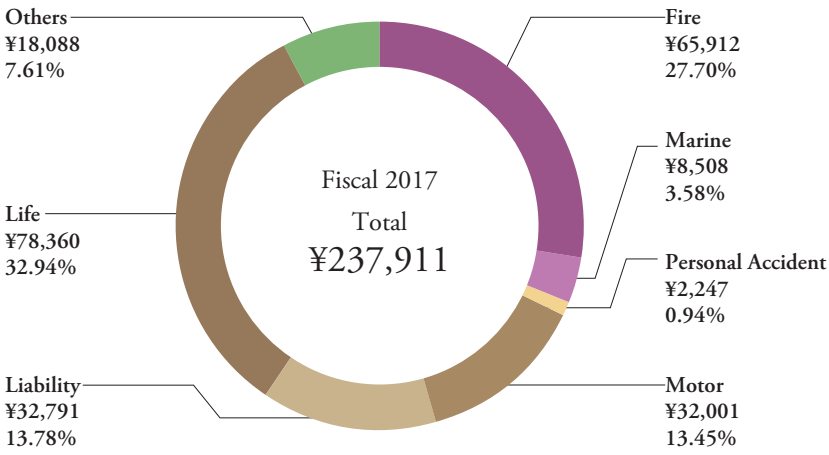
Consolidated Financial Highlights

	Millions of yen					Thousands of U.S. dollars
	2019	2018	2017	2016	2015	**2019**
For the year ended March 31						
Ordinary income	**¥266,625**	¥254,934	¥251,462	¥245,114	¥246,264	**$2,402,243**
Net premiums written	**248,288**	237,911	223,749	223,786	208,962	**2,237,030**
Ordinary profit (loss)	**(7,390)**	9,857	14,022	9,655	19,112	**(66,582)**
Net income (loss) attributable to owners of the parent	**(7,150)**	9,191	10,512	5,674	5,805	**(64,420)**
As of March 31						
Total net assets	**179,944**	200,550	191,907	180,826	199,334	**1,621,263**
Total assets	**694,088**	687,950	698,418	688,242	689,631	**6,253,608**

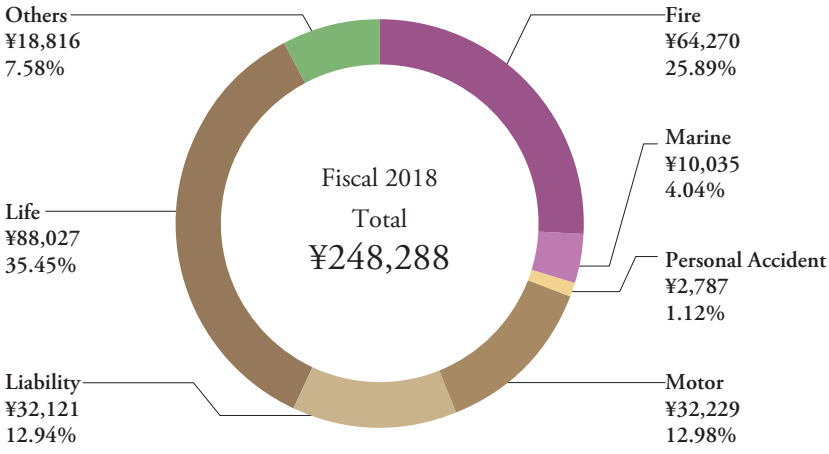
(Rate: ¥110.99 = US$1)

Net Premiums Written by Class (Consolidated Basis)

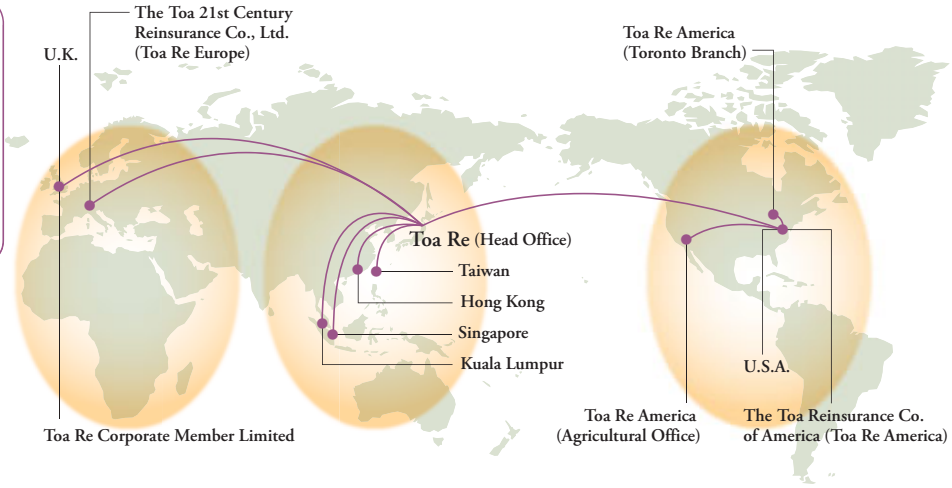
(Millions of yen)



(Millions of yen)



Overseas Network



Locations

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Supplemental Data: Results of Japanese Major Non-Life Insurance Companies for Fiscal 2018, Ended March 31, 2019 (Non-Consolidated Basis)

(Unit: Millions of yen, %)

		MS&AD Holdings		Tokio Marine Holdings		Sompo Holdings	Toa Re
		Mitsui Sumitomo	Aioi Nissay Dowa	Tokio Marine & Nichido	Nisshin	Sompo Japan Nipponkoa	
Net Premiums Written	**Fiscal 2018**	**1,512,449**	**1,233,581**	**2,166,627**	**143,798**	**2,148,632**	**194,952**
	Fiscal 2017	1,500,326	1,222,017	2,144,780	141,820	2,168,009	185,570
Net Claims Paid	**Fiscal 2018**	**910,965**	**770,582**	**1,379,707**	**90,161**	**1,377,796**	**143,824**
	Fiscal 2017	836,385	660,699	1,225,285	75,185	1,272,130	131,092
Underwriting Profit (Loss)	**Fiscal 2018**	**47,335**	**15,555**	**89,199**	**1,509**	**41,990**	**(1,215)**
	Fiscal 2017	84,494	4,843	86,638	5,314	94,815	(1,372)
Ordinary Profit (Loss)	**Fiscal 2018**	**226,476**	**61,382**	**315,370**	**5,069**	**215,537**	**4,088**
	Fiscal 2017	262,552	5,616	325,847	7,574	175,220	5,115
Net Profit (Loss) for the Year	**Fiscal 2018**	**171,102**	**37,307**	**261,384**	**4,403**	**175,708**	**1,686**
	Fiscal 2017	198,237	15,620	253,895	5,346	170,032	4,987
Total Assets	**Fiscal 2018**	**6,977,145**	**3,410,989**	**9,393,039**	**396,474**	**7,515,887**	**505,486**
	Fiscal 2017	7,098,216	3,486,669	9,669,833	414,872	7,688,176	490,545
Ratio 1 Loss Ratio (%)	**Fiscal 2018**	**66.2**	**67.8**	**68.8**	**69.5**	**69.8**	**73.8**
	Fiscal 2017	61.6	59.2	62.0	59.7	64.4	70.6
Ratio 2 Expense Ratio (%)	**Fiscal 2018**	**31.5**	**33.8**	**30.6**	**34.2**	**32.1**	**25.2**
	Fiscal 2017	31.3	33.4	30.7	33.5	32.3	24.8
Ratio 3 Yield on Investments (Income) (%)	**Fiscal 2018**	**2.18**	**2.22**	**3.35**	**1.48**	**2.45**	**1.88**
	Fiscal 2017	2.04	2.21	3.16	1.39	1.87	2.05
Ratio 4 Yield on Investments (Realized Gains/Losses) (%)	**Fiscal 2018**	**4.34**	**2.60**	**4.45**	**2.02**	**4.13**	**1.70**
	Fiscal 2017	4.35	0.76	4.56	1.49	2.38	2.20
Ratio 5 Solvency Margin Ratio (%)	**Fiscal 2018**	**723.2**	**688.2**	**825.4**	**1,219.9**	**722.2**	**812.8**
	Fiscal 2017	701.1	784.0	827.3	1,321.2	735.1	831.5

Sources: Each company's financial statements of fiscal 2018

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