

Japan's Insurance Market 2016

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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 2016*. 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 2015, the year ended March 31, 2016, the world economy initially remained on a moderate recovery track centering on the U.S. and other developed countries. However, vigor diminished from the New Year onward because of the economic slowdown of China and certain other emerging economies as well as the impact of declining oil prices.

Although the moderate recovery of the Japanese economy continued, as indicated by the upward trend of corporate earnings, growth stalled toward the second half of the year under review, affected mainly by the slowing down of emerging economies.

In the non-life insurance industry in Japan, net premiums written trended upward, primarily because of the impact of the revision of the mainstay automobile insurance products and their premium rates and last-minute demand before the revision of fire insurance products.

In the life insurance industry in Japan, the amount of new policies and the amount of policies in force both increased steadily, reflecting brisk sales of single-premium insurance products and an increase in group pension insurance contracts. Toward the end of the fiscal year, however, sales of certain products were suspended following the introduction of negative interest rates by the Bank of Japan.

The large amount of capital flowing from financial markets into the reinsurance market and the profitable performance of reinsurance companies contributed to further softening of reinsurance premium rates and conditions, and competition among reinsurers continued to intensify.

Softening of reinsurance premium rates and conditions, as well as mounting competition to win contracts, is expected to continue in the future. In addition, the need to respond to climate change, the increasing complexity of risks, and strengthened international regulations and frameworks for reinsurance are becoming more pronounced. Thus, a challenging business environment is expected to persist.

By endeavoring to act as an exemplary reinsurance company, we are resolved to fulfill our mission: "Providing Peace of Mind."

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
The Toa Reinsurance Company, Limited

The Property and Casualty Insurance Market in Japan and the Business Strategy of Sompo Japan Nipponkoa Insurance Inc.

1.

Keiji Nishizawa

President
Sompo Japan Nipponkoa Insurance Inc.

1. Overview of Japan's P&C Insurance Market

Net premiums written for Japan's property and casualty (P&C) insurance companies totaled 7,957.0 billion yen¹ for fiscal 2014, making Japan the world's fifth largest P&C insurance market² after the United States, China, Germany and the United Kingdom. Forty-five P&C primary insurance companies currently operate in Japan. However, the market is actually an oligopoly of three large groups, known as the mega P&C insurance groups, that have a dominant market share of about 90%. It is one of the features of Japan's P&C insurance market.

Net premiums written have increased for four consecutive years, even though the 4.5% year-on-year increase for fiscal 2014 was below the year-on-year increase of 5.8% for fiscal 2013. Net premiums written increased in all the major classes of business in automobile, fire, liability and personal accident insurance.

By class of business, automobile-related insurance accounted for the largest share with 61.6% of net premiums written, of which automobile insurance totaled 48.8% and compulsory automobile liability insurance totaled 12.8%. Fire insurance accounted for 13.7%, miscellaneous casualty insurance including liability insurance accounted for 11.6%, accident insurance accounted for 9.8%, and marine insurance accounted for 3.2%.

Net claims paid totaled 4,965.2 billion yen. Underwriting was profitable for the first time in five years, with a loss ratio of 62.4%, and a combined ratio of 95.1%. Overall, results in the P&C insurance market show a recovery trend, with a pronounced contribution by automobile insurance which is a core product and its profit structure reforms were in place including rate revisions to the classification rating system for non-fleet automobile insurance.

Insurance agencies are the main sales channel, and accounted for 91.4% of net premiums written for the primary insurance business. In addition, the ratio of direct sales that bypass agencies (such as internet or telephone), primarily through insurance companies solely with direct sales channels, increased by 0.1% from the previous year to 8.1%. While the increase was marginal, the ratio of direct underwriting has been increasing each year.

Figure 1: Net Premiums Written

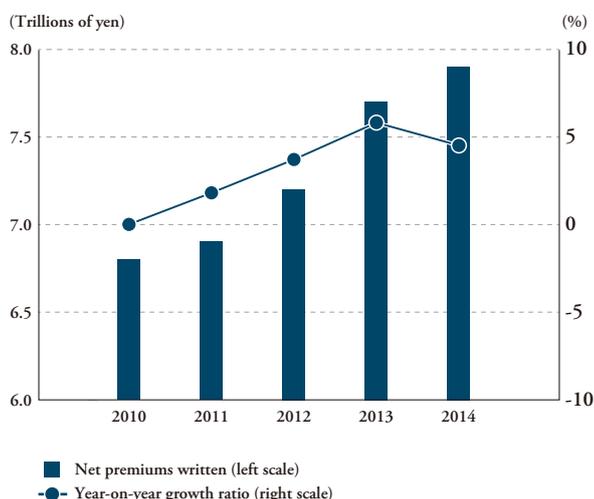
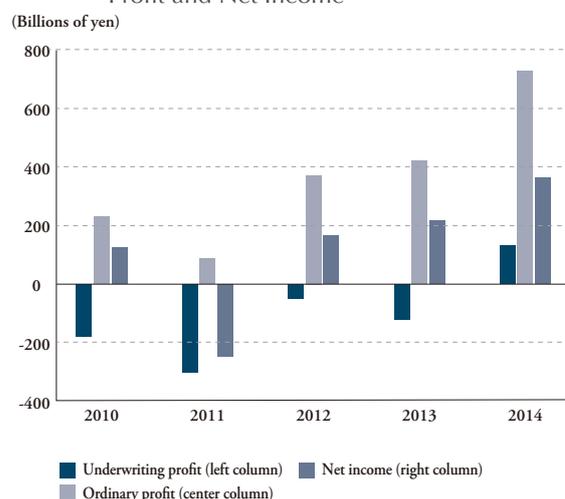


Figure 2: Underwriting Profit, Ordinary Profit and Net Income





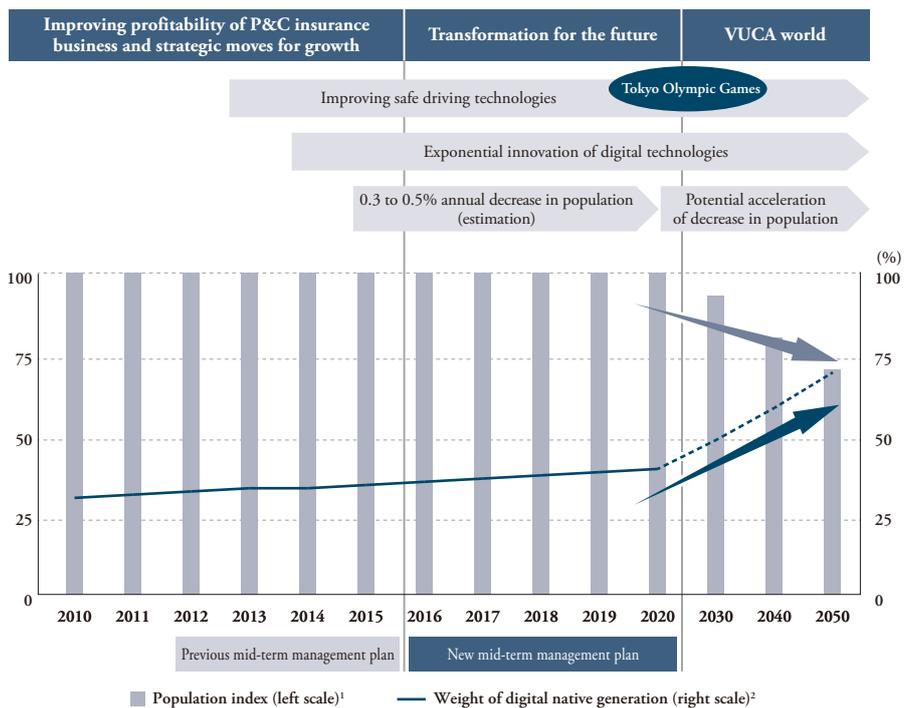
*2. P&C Insurance
Operating
Environment and
the SOMPO
Holdings Group’s
Initiatives*

(1) Operating Environment

The operating environment of Japan’s P&C insurance industry may well change significantly in the future. Along with concerns that the occurrence of major natural disasters will become the norm, other disruptive and drastic changes are expected including Japan’s declining population and the rapid aging of society, and the exponential innovation of digital technologies and related changes in customer behavior.

Looking at demographic change in Japan, the population is forecast to decrease 0.3% to 0.5% annually through 2020. Population decline will further accelerate and will decrease to 75% of the 2010 level by 2050. Over the medium-to-long term, aging and the decline in the working population will be a major issue confronting Japan. At the same time, the size of the digital native generation (the population that grew up with the Internet and personal computers) will increase rapidly. Customer behavior is forecast to change as Generation Y, born from 1980 to 1994, and Generation Z, born from 1995 onward, become core consumers.

Figure 3: Trends of Japan’s Population and the Digital Native Generation



Notes: 1. Indexed with the FY2010 population set to 100 (source: National Institute of Population and Social Security Research)
 2. Sum of Generation Y born from 1980 to 1994, and Generation Z born from 1995

The social significance of the P&C insurance industry is large in this time of change. Sompo Japan Nipponkoa Insurance is a Group that has focused on the insurance business for more than 120 years, and our goal is to contribute to society by supporting “globally active Japanese companies” and “the security, health, and wellbeing of our customers” by providing insurance and related services of the highest quality possible in periods of change. Acutely aware that we need transformation with an eye focused on the uncertainties of the future, we are working to realize sustainable corporate value over the medium and long term.

(2) New Mid-Term Management Plan (FY2016 to FY2020)

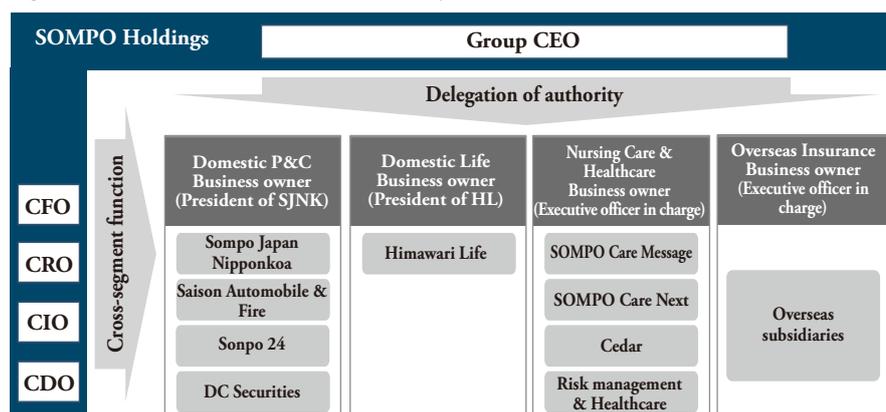
In May 2016, Sompo Japan Nipponkoa Holdings, Inc., which plans to change its company name to SOMPO Holdings, Inc. on October 1, 2016, formulated a new five-year mid-term management plan as its growth strategy through fiscal 2020. The goal of the plan is realizing the Group Management Philosophy aimed at contributing to the security, health and wellbeing of customers and society as a whole by providing insurance and related services of the highest quality possible. Under the new Mid-Term Management Plan, SOMPO Holdings will seek to evolve into a Group that is able to respond firmly and rapidly to disruptive changes in the environment, based on the growth cycle achieved in the previous Mid-Term Management Plan ended fiscal 2015. Aiming to contribute to society by realizing its Group Management Philosophy, SOMPO Holdings will achieve a structural transformation into the best customer service provider based on the theme of “security, health and wellbeing.” At the same time, the Group will steer a course to establish a position where it is able to compete effectively against global players.

(3) Introduction of the Business Owner System and Enhancement of Group Cross-Segment Functions

From April 1, 2016, SOMPO Holdings adopted a new Group management system based on our four core businesses – Domestic P&C Business, Domestic Life Business, Nursing Care & Healthcare Business, and Overseas Insurance Business – and positioned a president/executive officer as the business owner for each of these businesses. We have delegated authority to the business owners for business strategy proposals, investment decisions, and talent development. Under this system, the business segments, which are closer to customers, will cope with major environmental changes through agile decision-making and business execution. Each business will establish and enhance its competitive presence and realize sustainable growth.

SOMPO Holdings will realize its centralizing power by establishing a system that strengthens its response to the key challenges the entire Group faces, such as digital strategies, as well as the links among business segments. This will enable the Group to create total support services that contribute to “security, health and wellbeing” and to develop new business, and to expand the scope of its existing business.

Figure 4: Overview of Business Owner System





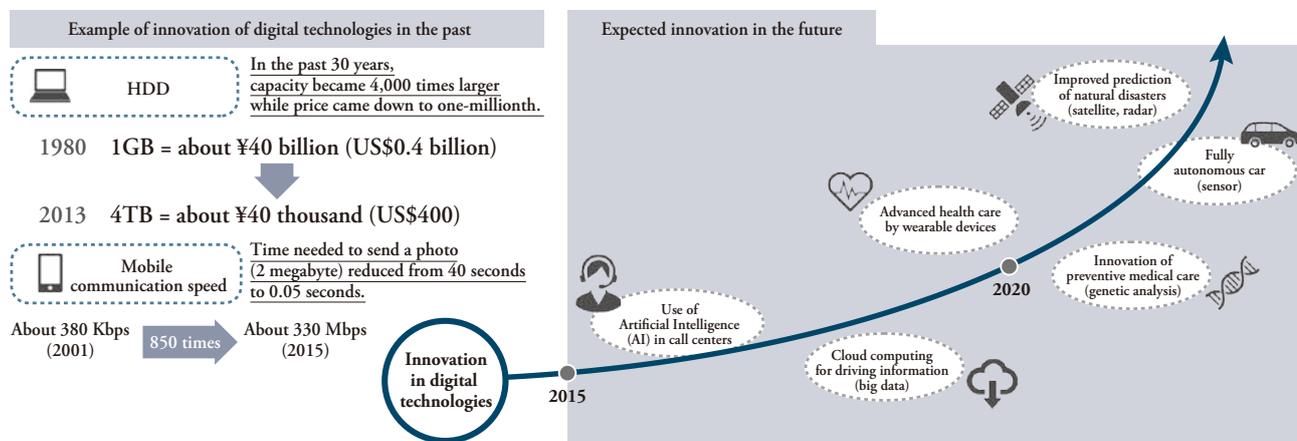
(4) Digital Strategy

To enhance the quality of existing businesses, the Group will harness digital technologies to upgrade and expand its customer contact, in addition to providing services that are focused on customers through people.

As one of several measures aimed at strengthening cross-functions, the Company established SOMPO Digital Lab in Tokyo and Silicon Valley in the United States in April 2016, as bases for research and development in the field of digital technology. Through this measure, the Company aims to stay ahead of exponential advances in technology and to consolidate the Group's competitive advantages. Furthermore, to swiftly execute the Company's strategies for digital technology, the position of Chief Digital Officer (CDO) was established in the Group in May 2016, and the Company recruited new talent with strong backgrounds in the field of digital technology. The Lab also welcomed Thomas H. Davenport, the world's top expert on analyzing big data, and other leaders from various industries on board as senior advisors. The goal is not only to streamline operations in each business segment, but to use advanced digital technologies to create new customer contact points, market products to digital natives, research and develop completely new business models, and so forth.

Figure 5: Expected Digital Innovation in the Future

Exponential innovation of digital technologies is game-changing opportunity

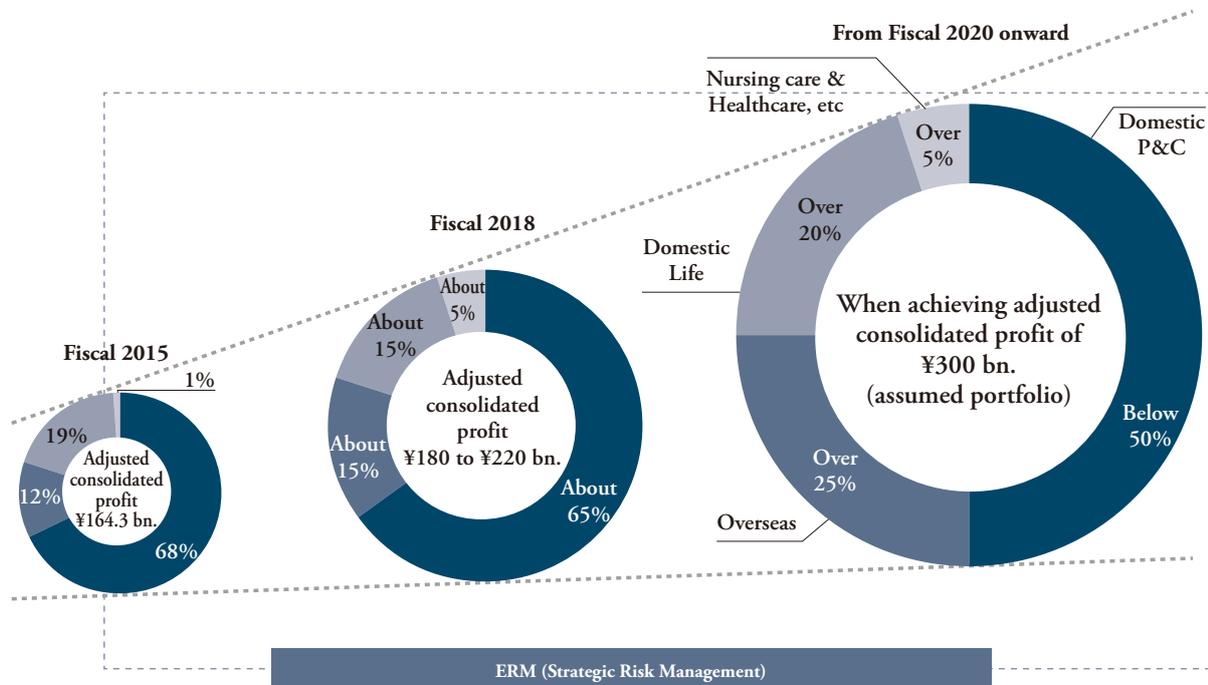


(5) Business Portfolio Transformation

We are transforming our businesses as follows to build a well-balanced business portfolio that enables us to maximize risk diversification effect. We expect to achieve our target of adjusted consolidated profit of 300 billion yen from 2020 onward by reducing the share of the Domestic P&C Business in our business portfolio from 68% for fiscal 2015 to 50% or less when the Group has achieved the target above. Sampo Japan Nipponkoa Insurance, which has the Group's largest customer base, scale and earnings, will lead the Group in connecting business segments and continuing to create new value for customers to build total support for "security, health and wellbeing."

1. The Property and Casualty Insurance Market in Japan and the Business Strategy of Sompo Japan Nipponkoa Insurance Inc.

Figure 6: Transition of Business Portfolio



3. Sompo Japan Nipponkoa Insurance's Growth Initiatives

Based on the Group's vision, we will be the most evaluated P&C insurance company and achieve growth accompanied by quality. The Domestic P&C Business, our core business in our home market of Japan, will earn the trust of customers and enhance its profile by growing to contribute to a bright future for the Group.

Under the theme for the Domestic P&C Business's growth strategy of "Value-generating innovation – the most evaluated P&C insurance company", we will implement initiatives for growth.

(1) Future Innovation Project

We will implement a fundamental review of all business processes and improve productivity by reforming and slimming our business processes and system infrastructure to achieve a global top-level company expense ratio when the project is complete.

A. Business process reform

We aim to realize services innovation in our claims payment procedure, which means automating payment of insurance benefits by using a Business Rule Management System (BRMS) and artificial intelligence (AI). In addition, we will eliminate administrative work in sales offices to enable us to reduce sales headcount by about 12%.



B. System and information platform reform

We will create a simple system with advanced technologies and reduce the number of steps to less than half the current level to increase capabilities and speed of development. As a result, we will enable agile product development and shorten product development from seven to two months.

(2) Digital Strategy

We will focus on four important themes in rapidly researching, developing and introducing the latest digital technologies to energetically identify digital technology evolution and related changes in customer behavior.

- Marketing to digital natives (Generations Y and Z)
- Creating digital customer contact points (connected service)
- Improving productivity and business efficiency (cognitive computing)
- Structuring new business models using digital technology

(3) Product Strategy

We will use leading-edge digital technologies. For instance, Sompo Japan Nipponkoa Insurance has launched “Portable Smiling Road” which is a telematics service for individual users with a "Security" function for giving notification of an accident to us with a single button push in the unlikely event of an accident occurring, and a "Safety" function that performs a driving analysis and provides information in real time to help prevent accidents. These are provided together with a "Comfort" car navigation function.

We will also aggressively invest in R&D (Research and Development) in areas including products and services that address changing customer needs and lifestyles, and take advantage of the individual features of each Group company's business foundation and model to continue to take on the challenge of creating a new business model for the entire Group.

Notes: 1. Figures based on 28 domestic primary P&C insurance companies (Source: Insurance Research Institute, *The Statistics of Japanese Non-Life Insurance Business, 2014*)

2. Source: Swiss Re, *Sigma No. 4/2015*

3. Source: The General Insurance Association of Japan, *Factbook 2015*

Trends in the Cooperative Insurance Business in Japan

2.

Toshihiro Takeda

Director
Japan Cooperative Insurance Association Incorporated

1. Overview of the Cooperative Insurance Business

With regard to the legal form of entities, Japan's Insurance Business Act, which regulates insurance companies, only allows joint stock corporations and mutual companies to conduct insurance business. Therefore, cooperative societies were not able to conduct insurance business directly until the enactment of various cooperative laws after World War II, from 1947 to 1949. With authorization under these cooperative laws, cooperative societies have been allowed to provide insurance for their members. Each cooperative provides insurance coverage that is structured and priced according to the features and demands of its members, such as farmers, fishermen, office workers, consumers, the self-employed and small and medium-sized business owners. These cooperatives have grown steadily with the understanding and support of their members.

In addition, regulations other than cooperative laws also authorize organizations of farmers and fishermen to operate in the cooperative insurance business.

List of Cooperative Insurers According to Applicable Laws

Applicable Laws		Regulators	Major Organizations (JCIA members are underlined)	
Cooperative Law	Agricultural Cooperative Society Law	Ministry of Agriculture, Forestry and Fisheries	<u>Zenkyoren</u> & Agricultural Cooperatives at Prefectural and Regional Level ⁽¹⁾	
	Fisheries Cooperative Association Law		<u>Kyosuiren</u> & Fisheries Cooperatives at Prefectural and Regional Level ⁽¹⁾	
	Consumers' Livelihood Cooperative Society Law	Ministry of Health, Labor and Welfare	Region	<u>CO-OP Kyosairen</u> , <u>Zenkokuseikyoren</u> , <u>Seikyo Zenkyoren</u> , <u>Kanagawa Kenmin Kyosai</u> ⁽¹⁾
			Industry	<u>Daigaku Seikyo Kyosairen</u> , <u>Boeisho Seikyo</u> , and others
			Region/Industry	<u>Zenrosai</u> , <u>Nihon Saikyosairen</u>
Small and Medium-Sized Enterprise Cooperatives Act	Ministry of Economy, Trade and Industry, and others	<u>Nikkaren</u> & Fire Insurance Cooperatives at Prefectural and Regional Level <u>Zenjikyō</u> & Automobile Insurance Cooperatives at Prefectural and Regional Level <u>Chusairen</u> & Welfare insurance cooperatives at Prefectural and Regional Level <u>Kokyoren</u> ⁽²⁾ & Truck transport insurance cooperatives ⁽¹⁾ , and others		
Special Indemnity Law	Agricultural Disaster Indemnity Law	Ministry of Agriculture, Forestry and Fisheries	Agricultural Disaster Indemnity Associations ⁽¹⁾ , <u>NOSAI Zenkoku</u>	
	Fisheries Disaster Indemnity Law		Fisheries Disaster Indemnity Associations ⁽¹⁾ , <u>Gyosairen</u>	
	Act on Compensation of Damages Related to Fishing Vessels		Hull Damage Indemnity Associations ⁽¹⁾ , <u>Gyohocyu</u>	

Notes: 1. Regulated at prefectural levels.

2. Regulated by the Ministry of Land, Infrastructure, Transport and Tourism.



2. Status of the Cooperative Insurance Business

The Japan Cooperative Insurance Association Incorporated (JCIA) publishes the *Cooperative Insurance Yearbook* in collaboration with 42 cooperative societies and federations that operate in the cooperative insurance business. According to the 2016 edition of the *Cooperative Insurance Yearbook*, issued in December 2015, the number of members was 75.58 million in fiscal 2014, an increase of 8.19 million during the 10 years from fiscal 2004, with pronounced growth in consumer cooperative membership.

The total assets of cooperative insurers was 62.0518 trillion yen, an increase of 13.7 trillion yen during the 10 years from fiscal 2004. Cooperative insurers had 154.28 million policies in force, an increase of 7.54 million policies over the past 10 years. Gross premium income in fiscal 2014 totaled 7,806.7 billion yen, which is 281.0 billion more than the 2004 figure. Claims paid totaled 4,565.6 billion yen in fiscal 2014, an increase of 85.5 billion yen compared to 2004.

While the results of individual cooperative insurers reflect particular features and the operating circumstances of each entity, as a whole the cooperative insurance business involves a large number of people and cooperative insurance policies. Therefore, it is certain that the roles expected of cooperative insurers and the responsibilities assigned to them in providing security in the lives of cooperative society members will be even greater over the medium-to-long term.

3. Key Recent Trends in the Cooperative Insurance Business

(1) Enforcement and Application of the Insurance Act

The Insurance Act was newly enacted in 2010. Until then, the Commercial Code stipulated the basic rules for contractual elements of insurance policies, but cooperative insurers were not subject to the Commercial Code because of their not-for-profit status. Each cooperative insurer independently formulated its own cooperative insurance contracts with the approval of its own supervisory authority.

The Insurance Act now applies to not only insurance contracts but also to cooperative insurance contracts because the social roles and responsibilities of cooperative insurers have evolved. The Insurance Act revised the section on insurance in the former Commercial Code with a view to modernizing the rules and strengthening policyholder protections. With the enactment of the Insurance Act, legally required protections for cooperative insurance policyholders' interests became the same as those for commercial insurance policyholders. This is an important advantage for cooperative members who are or will be cooperative insurance policyholders.

(2) The Great East Japan Earthquake

The Great East Japan Earthquake occurred on March 11, 2011, and exacted a terrible toll on the lives and assets of many people over a wide area. JCIA's member societies paid a total of 1,000 billion yen for 935 thousand claims resulting from the earthquake damage. These figures were comparable to the benefits paid by life insurance and earthquake insurance of commercial insurance companies, and demonstrate that cooperative insurance as well as commercial insurance is an indispensable component of the system that protects the lives of Japanese citizens who are exposed to the threat of earthquakes, tsunami and volcanic eruptions.

In addition to the benefits that cooperative insurance paid, many cooperatives

supported victims of the earthquake in accordance with the founding spirit and scope of operations of each entity, and contributed to reconstruction in afflicted areas. These actions enhanced understanding and appreciation of the fact that these functions and roles of cooperatives that aim for voluntary mutual aid among cooperative members are a requisite for sustainable communities.

The response to the Great Kumamoto Earthquake of April 2016 has drawn on experience gained in the Great East Japan Earthquake.

(3) International Year of Cooperatives

The United Nations designated 2012 as the International Year of Cooperatives (IYC). The United Nations did so in recognition of the durability and resilience cooperatives demonstrated during the worldwide food crisis of 2007 and the financial and economic crises from 2008 onward. The aim of the United Nations was to raise the public's awareness of the role of cooperatives in reducing poverty, creating jobs and bringing society together, to encourage the establishment and development of cooperatives and to lobby governments and related institutions for the aims above. Under the globally shared theme of "Co-operative Enterprises Build a Better World," many related events and public relations programs also took place in Japan.

The International Co-operative Alliance (ICA) announced the "Blueprint for a Cooperative Decade" in February 2013 to carry on the work after the close of IYC. The ideal it propounds for cooperatives worldwide through 2020 is for them to be "the acknowledged leader in economic, social, and environmental sustainability," "the model preferred by people," and "the fastest growing form of enterprise." Cooperatives in Japan engaged in the cooperative insurance business share these goals and strategies for cooperative action with other cooperatives around the world.

4. The Future of the Cooperative Insurance Business

All cooperative laws regulating different types of cooperatives stipulate that cooperatives should be not-for-profit entities that operate to serve their members. Cooperatives have a history of creating cooperative insurance businesses for members in regions where the spread of commercial insurance coverage lagged and for members with needs not satisfied by other commercial insurance options. Each of these cooperative insurers has its own philosophy and scope of business. They must continue to demonstrate their purpose, responsibility and roles by addressing contemporary needs and expectations through their daily interaction with members. In this way, they will demonstrate their uniqueness and strength, complementing commercial insurance. The continuation of this system will be beneficial to the security of all citizens of Japan.

In the cooperative life insurance business, the aging of Japanese society has increased demand for cooperative insurance coverage associated with post-retirement medical care, annuities and nursing care, and the number of members purchasing cooperative insurance policies for asset management and inheritance has increased.

In the cooperative non-life insurance business, it should be pointed out that cooperatives need to encourage more members to purchase cooperative insurance pol-



icies that cover the natural disasters common in Japan including earthquakes, tsunami, volcanic eruptions and typhoons. In the cooperative automobile insurance business, it is important to address contemporary issues including the rising number of accidents involving elderly people and the evolution of autonomous driving technologies. Moreover, regardless of the type of cooperative insurance, it has become more important than ever to explain coverage and policy procedures so that members can easily understand them and agree to them with confidence, in addition to rigorous compliance with laws and regulations, and the protection of personal information. Given the changes in the operating environment, cooperatives that are involved in the cooperative insurance business must accurately identify and address the respective needs and expectations of their members.

Many years have passed since the launch of the cooperative insurance business. The business has grown, however, giving rise to the question of whether the contents and activities are similar to the commercial insurance business, and whether the identity of each cooperative and the unique features compared with commercial insurance have become diluted. Cooperative insurance used to be recognized as superior to commercial insurance because the premiums were low, but the liberalization of premium rates and the diversification of sales channels have blurred that competitive advantage. Furthermore, during the past several years neo-liberals in Japan and abroad have been advocating an equal regulatory footing for commercial insurance and cooperative insurance.

Under these circumstances, each cooperative involved in the cooperative insurance business needs to earn the understanding and support of its members and the public by adopting a contemporary view of its philosophy, goals, purpose and roles, and by sharing that view within and outside the cooperative. This issue is one of the priorities of the “Blueprint for a Cooperative Decade” mentioned above.

Cooperatives must therefore educate and train employees involved in the cooperative insurance business and enhance the information they provide to members who are or will be policyholders.

Conclusion

Modern Japan is confronted by various social issues that threaten people's lives and future, including the aging of society and numerous natural disasters mentioned above, employment instability, widening income disparities and poverty, the disintegration of communities, the hard-pressed social security system, and environment and energy problems. Today more than ever, international society has high expectations for the role and potential of not-for-profit cooperatives that are democratically managed based on the principle of mutual aid. Japan's cooperatives must also address an array of changes in their operating environment to contribute to a sustainable society. The cooperative insurance business is also required to serve as a part of the operations of cooperatives by ensuring sound management and providing insurance coverage aligned with the needs of even more members to eliminate the risks and anxieties they face.



3.

Typhoon Flood Risk in Japan

Margaret Joseph

Model Product Manager
RMS

Foreword

Ten years ago, a video game was released in Japan, the second in the *Zettai Zetsumei Toshi* (絶体絶命都市) series of action adventure games, that saw the imaginary Japanese underground city of Tomisakashi flooded from torrential rain and river levee failure. It's not clear what was driving the heavy rain in the video game, though with typhoons delivering some of the most intense precipitation observed in Japan, in this scenario it's reasonable to imagine that a typhoon was behind this fictional flooding. The game was set in the year 2010, but what of the typhoon flood risk in 'real' Japanese cities in 2016, beyond those of the realm of anime (Japanese computer animation). What is the risk of typhoon flood in present day Japan? And how can this risk be managed from an insured exposure perspective, compared to securing your survival in the video game?

In Tokyo Prefecture in the Kanto region of Japan, around 35 percent of the 200-year return period typhoon loss is driven by flood. This represents a loss ten times the 2015 operating profits of Sony Corporation, who created the *Zettai* games series. 650km southwest of Tokyo Prefecture, in the Chugoku region lies Hiroshima Prefecture. Flood at the 200-year return period loss here is just over 40 percent of the total typhoon loss, which increases to 80 percent when 1,000-year return period loss. The drivers of typhoon flood for Tokyo compared to Hiroshima are different, with typhoon inland flood driving the flood figures in Tokyo and typhoon coastal flooding for Hiroshima, but what is important is the significance of this water peril to typhoon loss for both areas, and highlights the impacts of typhoon flood at the 200-year regulatory level in Japan and at longer return periods. (*Figures from the RMS® Japan Typhoon HD Model, using the 2016 Japan Typhoon Insured Exposure Database. Analysis over all lines of business, and loss return period figures presented for the aggregate exceedance probability*).

We have considered examples at the prefecture level, but nationwide, typhoon flood contribution is not negligible and is approximately 13 percent at the 200-year return period considered above, and for average annual loss it is approximately 15 percent. In terms of recent examples of typhoon flood events you only have to consider last year's Tropical Storm Etau, which caused insured losses of 40 billion yen, and although not split by peril, the losses can be considered driven by flood given the damage reports. In addition, it seems reasonable to assume that the significance of flood to typhoon flood risk in Japan will increase, as the market observes an increase in (typhoon) flood that is being covered by insurance policies in Japan – with the expansion of water coverage, separate water policies, and the liberalization of policy conditions which allow for more water to be covered.

1. Challenges of Typhoon Flood Modeling in Japan

It is clear then that the flood component of typhoon risk cannot be ignored, and proper typhoon flood risk assessment is required, though there are many challenges for modeling typhoon flood in Japan as there are challenges in modeling flood risk more generally. These challenges include the fact that typhoon flood hazard is from multiple sources, from both inland and coastal flooding. For inland flooding, this comprises fluvial flooding (from rivers overflowing their banks/defenses) and pluvial flooding (driven by surface water from intense precipitation). For coastal flooding,



this includes storm surge, waves, and associated tides. In the video game, the source of flooding for *Tomisakashi* is inland only (in the central city setting), but as in the example of Hiroshima, above coastal flooding can be driving the flood loss for some localities. The contribution of coastal flooding as a proportion of the flood loss is around 60 percent increasing to over 95 percent for Hiroshima Prefecture at the 200- and 1,000- year return period loss respectively. And Japan events such as Typhoon Isewan/Vera (1959) and the more recent Tokage (2004) and Melor (2009) all highlight the contribution of coastal flood for individual events. A comprehensive assessment of Japan typhoon flood risk thus requires inclusion of both typhoon coastal and typhoon inland flood.

Beyond this, for both of these flood perils, Japan's geographical position, its latitude and location in relation to the 'average' typhoon track, have implications for the flood hazard through changes in the anatomy of a storm brought about from the phenomenon of extra-tropical transitioning. As a typhoon tracks north, into the subtropics and mid-latitude, it can interact with the jet stream which in many cases can change the typhoon into a cross between a tropical cyclone and a full extra-tropical cyclone. Storms that are transitioning or have transitioned when they impact Japan change the (wind field and the) shape and intensity of the precipitation field, and the storm surge and significant wave height. For Japan, such storms account for over 50 percent of those that make landfall (according to the historical record). Considering flood purely from tropical cyclones only for Japan is not suitable or accurate.

A further challenge and a principle source of uncertainty for flood modeling in general is flood management which includes flood defenses. Japan has one of the world's most advanced flood protection systems, with the government investing in flood management on an annual basis. However, a significant proportion of exposure in Japan is below the level of river and coastal defenses, indeed it is below sea level, and if defenses are breached or overtopped then widespread and severe flooding can result. Sophisticated defense modeling, including detailed defense inundation, and highly resolvable inundation modeling is required of the most physical methodology for Japan. (Further information on flood management and defense modeling in Tokyo below).

This certainly is not an exhaustive list of challenges faced in accounting for typhoon flood in Japan. Nor does it completely address the challenges faced in modeling flood – any type of flood – globally. There is also the consideration for antecedent conditions, the complexity of Japan's coastline and bathymetry in simulation of storm surge, wave and tide, and that flood is a high gradient peril, meaning that locations close together can have very different flood levels. And separate to the predominantly hazard orientated challenges discussed (determining the extent and depth of the flooding) there are challenges in the approach to flood vulnerability, limitations on flood data (both hazard and loss), accounting for policy structures for flood and mixed perils, and the list goes on. But it shows some of the challenges of flood modeling and of accurately capturing the components of typhoon flood risk.

Catastrophe modeling can be employed to understand this risk, providing probabilistic physical modeling at each component of the flood process – for inland flood through the full hydrological cycle from precipitation to inundation, and for coastal

flooding the simulation through the entire lifecycle of the storm to inundation beyond the defenses. Detailed component modeling provides a realistic representation of the risk, addresses the challenges in assessing the risk, whilst presents opportunities through enhanced understanding of the risk.

Model development is complete on the RMS® Japan Typhoon HD Model, which will be released in 2017. The model is a fully coupled typhoon wind, typhoon inland flood and typhoon coastal flood model, with explicit modeling of the perils allowing for differentiation of loss by peril. It incorporates the latest RMS innovations in wind and flood modeling, including the most scientifically advanced extra-tropical transitioning model on the market. The model was developed with scientific leaders in Japan and internationally, and in collaboration with industry partners in Japan including Tokio Marine and Sampo Japan.

We will now show two examples using the RMS model to address the typhoon flood challenges and provide insight into typhoon flood risk in Japan, with context behind the loss figures presenting in the opening paragraphs.

2. Inland Flooding in Tokyo Prefecture

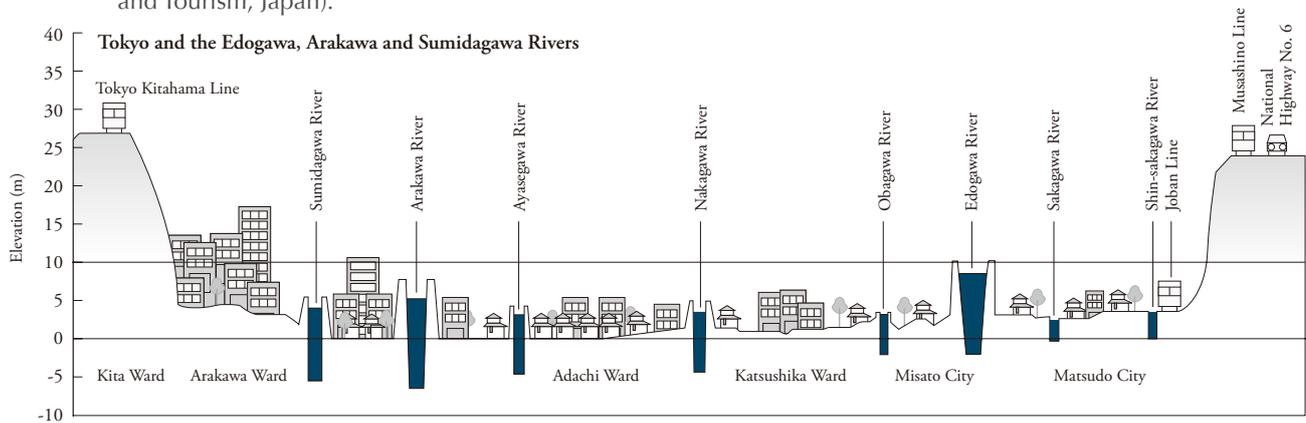
Rivers in Japan, as compared to rivers in Europe and North America, are short and steep, a result of the mountainous topography. Indeed in reference to Japanese rivers the Dutch civil engineer Johannes de Rijke commented that “rivers in Japan are like waterfalls”. Such channel topography with intense typhoon precipitation leads to high peak ratios as compared to mean flow, that is steep flood hydrographs, and a need to defend against these peaks. But what marks many of the rivers in Japan compared to their global counterparts, and notably here in Tokyo, is that the river elevation, through high exposure areas, is higher than the adjacent floodplain where the exposures are located. This heightens the risk from a hazard perspective, and contributes to the need for defenses. A cross section of Tokyo as compared to New York shows this feature in Japan – Figure 1.

Tokyo has a comprehensive flood protection system, which includes a complex system of river levees, super-levees, dedicated undeveloped flood plains, retention reservoirs both above and below ground, (and coastal sea walls up to five meters). According to the Japanese Ministry of Land, Infrastructure, Transport and Tourism (MLIT) river levees in Tokyo are built up to a 200-year return period. Added to this are the super levees – see figure 2 – such as those along the Arakawa River (the lower reaches of which itself were created as a flood diversion). Super levees are river defenses that are significantly wider than normal levees, around five to seven times as wide, and are approximately 30 times as wide as they are high, so that if the defense is overtopped it does not breach, and are in place where defense failure has the potential for significant damage, i.e. in areas of high exposure. Super levees have, as of mid-2016, been constructed at sites along the six major rivers in Tokyo and Osaka.

Tokyo Prefecture has the largest exposure concentration in Japan. With significant exposure below the height of the river levees, even below sea level, despite comprehensive flood protection, significant typhoon driven inland flood events are possible when defenses are overtopped and/or breached there is the potential for serious flooding propagating.



Figure 1: Cross section of Tokyo, and cross section of New York (River Bureau, Ministry of Land, Infrastructure, Transport and Tourism, Japan).



Note: The correct name for the “Tokyo Kitahama Line” is the “Keihin-Tohoku Line”.

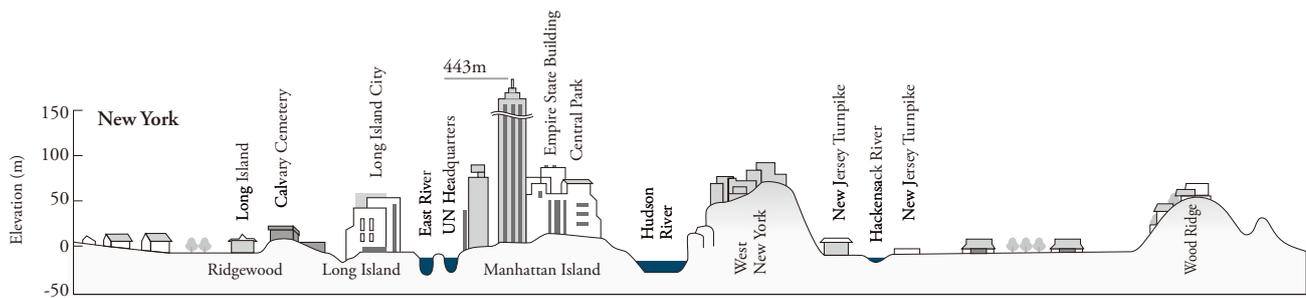


Figure 2: RMS Japan Typhoon model development team field surveying the levee (left) and super levee (right) defenses along the Arakawa River, with industry collaboration partners



The inland flood model of the RMS Japan Typhoon HD Model is a precipitation driven hydrological simulation, which has advantages over other approaches to flood modeling to include that it captures antecedent conditions, captures the correlation of flood events in space and time, and allows for the modeling of fluvial and pluvial flooding. The latter is important for accurately modeling typhoons as by their very nature they are typically short lived, very intense, precipitation events, and in capturing both ensures the majority of inland flood risk is explicitly modeled, to optimize

the accuracy of both the flood extents and flood depths.

The typhoon precipitation fields account for the transitioning phase of the typhoons – the asymmetry and frontal precipitation synonymous with extratropical transitioning or transitioned storms – which is important for Japan. Within the RMS Japan Typhoon Model more than a hundred rivers are explicitly modelled across Japan (including all Class A rivers in Japan – as defined by the MLIT) – equating to 20,000km of river channel. Using information provided by the Japanese government, RMS models defenses, modelling both defense overtopping and defense breaching. The model also makes assumptions about drainage and other flood control urban infrastructure. A physical inundation model is used, as there is the need for a high level of accuracy given the location of exposure in relation to the river channels. Whilst the flood hazard is modelled on a high gradient grid in Tokyo, and across Japan, of around 35 meters due to the high peril gradient of flood.

The potential for significant typhoon-induced inland flooding in Tokyo was shown in 1947 when heavy precipitation from Typhoon Kathleen resulted in widespread and significant flooding.

3. Coastal Flooding in Osaka and Hiroshima Bays (Osaka and Hiroshima Prefectures)

Seriously damaging typhoon-driven coastal flood events have occurred in Japan's history, such as Typhoon Isewan (Vera) in 1959. As a consequence of Vera, (and to protect against earthquake-generated tsunami) much of Japan is well defended against coastal flooding. However, coastal flooding still presents a potential risk, with recent losses from events such as Typhoon Tokage (2004), Melor (2009), and Chaba (2010).

To evaluate the coastal flooding from typhoons in Japan, RMS uses advanced ocean modeling, physically realistic storm surge and wave modeling, and sophisticated defense modeling (including detailed defense information) and, as with inland flood, the use of an in-house shallow water model for inundation modeling. The simulation of storm surge and wave over the path of the typhoons use both the hydrodynamic *MIKE21 Flow Model* (FM) and *MIKE21 Spectral Waves* (SW). Hydrodynamic modeling is necessary to account for the complex coastline and bathymetry of Japan in storm surge and wave modeling. Tide is also modeled which reflects the complex waterflows offshore Japan, particularly complex in the Seta Inland Sea and Ariake Sea. For Japan, accounting for wave in addition to storm surge is important given the height of the coastal defenses, with wave presenting a significant factor affecting defense performance, particularly where deep waters abut the defenses. Both storm surge and wave are driven by the track and windfield of the typhoons, which importantly includes information on the transitioning of the typhoon. As previously noted this change in the anatomy of the storm impacts the storm surge and wave – RMS research has shown that modeling transitioning historical typhoons as tropical cyclones could lead to inaccuracies of storm surge height up to 1.8 meters. RMS obtained detailed coastal flood defense information from MLIT (with local authority information for Hiroshima), and performed quality control through inspection of the terrain model, satellite imagery and on-site personal inspections. The model considers both overtopping and breaching scenarios, as with inland flood the importance of the performance of defenses is highlighted in the level of exposure below the defenses and below sea level – more than four million people live in



areas below sea level in the three large Pacific Coast bays of Tokyo, Ise and Osaka. RMS built the breaching model in collaboration with Prof. Jentsje van der Meer, Professor of Coastal Structures and Ports at UNESCO IHE in Delft, The Netherlands – a world renowned expert in the appraisal, design and testing of coastal structures. RMS also collaborated with the Port and Airport Research Institute (PARI), Japan, in relation to storm surge. And for coastal flooding, and the entire Japan Typhoon model, benefited from RMS modelers locally in Japan through RMS Japan.

Comparing the coastal flood risk in Osaka Bay to Hiroshima Bay (250km along the southern coast of Japan) you can see considerable differences between the inundation extent for the two bays – see Figure 3. The driver of the loss differential in this particular example has been shown through component analysis in the coastal flood module of the RMS Japan Typhoon Model to be a consequence of differences in defenses. Osaka Bay coastal defenses are built to the government defense height standard, as set by Typhoon Vera, as they are in Tokyo Bay and Ise Bay. In Hiroshima Bay, coastal defenses are not built to this level, and are considerably lower than in Osaka.

The inundations shown in Figure 3 are for long return period hazard- the 1,000-year. As noted above, at the 1,000-year typhoon flood loss is 80 percent for Hiroshima of which 77 percent is from coastal flooding. For such a tail event the ground up loss for Hiroshima is 30 times that of Osaka. Of the nationwide figures, contribution from coastal flooding is not a large proportion of Average Annual Loss, but it can have a large impact on tail risk locally and for particular lines of business.

(It is noted that coastal flood modeling is accounted for in Tokyo Prefecture, as is inland flood in Osaka and Hiroshima Prefectures in the RMS Japan Typhoon Model. However in terms of coastal flooding in Tokyo Bay modelled coastal flood inundation occurs only at the very extreme tail and in isolated areas).

3. Typhoon Flood Risk in Japan

Figure 3: Coastal flood inundation in Osaka Bay (left) and Hiroshima Bay (right) at the 1,000 year hazard return period



Summary

The flood component of typhoon risk in Japan is important to quantify for a comprehensive view of typhoon flood risk, and the RMS Japan Typhoon HD Model can provide such an insight into this water peril through sophisticated probabilistic modelling of all components of typhoon flood. With an understanding of the complete typhoon risk, users can then continue to develop their (re)insurance activities, as one might advance in levels of a video game.

About RMS: RMS models and software help insurers, financial markets, corporations, and public agencies evaluate and manage catastrophe risks throughout the world. We lead an industry that we helped to pioneer—catastrophe risk modeling—and are the innovators of the RMS (one)[®] platform, which is transforming the world's understanding and quantification of risk through open, real-time exposure and risk management. More than 400 insurers, reinsurers, trading companies, and other financial institutions trust RMS models and SaaS solutions to better understand and manage the risks of natural and human-made catastrophes, including hurricanes, earthquakes, floods, terrorism, and pandemics. For more information, visit www.rms.com



Storm Surge Risk in Japan

4.

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Foreword

The Muroto Typhoon and Typhoon Vera (Isewan Typhoon) exemplify the damage due to typhoons in Japan, but in recent years low-pressure systems have also frequently caused storm surge that does not result from a typhoon. Storm surge is a phenomenon in which a rise in sea level is caused by strong storm-driven winds as well as air-pressure differentials. One feature of storm surge is the striking localized rise in sea level that extends deep into the inner part of a bay compared to a tsunami, the mechanism of which differs from that of a storm surge. As many typhoons that strike Japan pass from south to north, bays that face south are particularly susceptible to storm surge danger. The three large bays of Tokyo Bay, Ise Bay and Osaka Bay, all of which are near major urban areas with accumulated insurance exposure, are recognized as bays that are at high risk to storm surge. In fact, serious damage has occurred in these bays in the past.

While Japan has experienced many cases of severe storm surge damage in the past, many people nationwide are currently more concerned with tsunami damage than storm surge damage. This is due to factors such as the tsunami damage from the Great East Japan Earthquake in 2011, the focus on modeling of the likelihood of a future earthquake, as well as the promotion of countermeasures by the Japanese government. Japan's national and local governments are estimating storm surge damage and designing coastal revetments based on these models. At the same time, companies and residents in areas at risk of storm surge seem little concerned about the danger, leading me to think there is quite a gap between the government's perception of risk from storm surge and that of ordinary people.

This report discusses storm surge risk in Japan using historical storm surge data and government scenarios. It also presents InterRisk Research Institute & Consulting, Inc.'s research into evaluating storm surge risk in the three large bays mentioned above in light of global warming.

1. Historical Storm Surge Disasters in Japan

The best known storm surge disaster in Japan occurred at Ise Bay during Typhoon Vera in September 1959. Central pressure of the typhoon was 895hPa, maximum wind speed was 75m/s, and the diameter of the typhoon was estimated at up to 2,500km. Storm surge was measured at about 3.5m in Nagoya City, Aichi Prefecture and 2.9m in Yokkaichi City, Mie Prefecture, and more than 5,000 people were reported dead or missing. More than 360 thousand homes were flooded, and the present value of total economic damage caused by Typhoon Vera is estimated at 4.5 trillion yen. Tokyo Bay suffered extensive storm surge damage from Typhoon Kitty in 1949. The occurrence of 1.4m storm surge at high tide inflicted further damage. In the end, 160 people either died or went missing, and 16,497 homes were totally or partially destroyed. Storm surge in Osaka Bay due to the Muroto Typhoon in 1934 was 3.1m. More than 3,000 people either died or went missing and 90 thousand homes were totally or partially destroyed.

In recent years, storm surge associated with the Typhoon No.18th (Melor) in 2009, at Mikawa Port in the eastern part of Ise Bay led to damage from numerous drifting containers. In addition, homes were flooded in 2014 and then again in 2015 in Nemuro City, Hokkaido due to storm surge associated with a low-pressure system.

2. Storm Surge Risk in the Three Large Bays

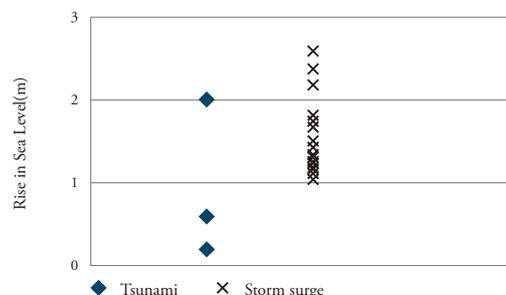
In 2012, the Japanese government stunned the world by announcing a sensational model based on a tsunami of up to 34m generated by a Nankai Trough earthquake. In 2010, the government issued a model of a storm surge with an inundation depth of 5m. Comparing the two scenarios, most people would think that the damage from storm surge would be less. However, when we look at the characteristics of tsunami and storm surges, then evaluate the estimates, we can see in fact that it is not simply a story of a tsunami being more harmful than a storm surge.

Why? Consider the results of the government's inundation models for the inner part of Tokyo Bay, around which companies and population are concentrated. Estimates show damage from a storm surge with an inundation depth of 5m exceeds damage from either a 3m high tsunami from an earthquake in the Nankai Trough or a 4m high tsunami from an inland earthquake beneath the Tokyo Metropolitan Area. A feature of storm surge is its striking rise in the sea level of the inner part of a bay. Therefore, storm surge could potentially raise sea level higher than a tsunami in Japan's three large bays around which population and structures are concentrated. Estimates show that some areas where flooding from storm surge is expected show no damage in the event of a tsunami. This means that tsunami countermeasures do not completely protect against storm surge.

Estimates showing that storm surge risk exceeds tsunami risk are not limited to Tokyo Bay. Ise Bay near Nagoya City is another example, as it is exposed to the risk of both tsunami from earthquakes in the Nankai Trough and storm surge from typhoons. Aichi Prefectural Government is analyzing potential water levels from storm surge and comparing them to those of a tsunami caused by an earthquake in the Nankai Trough expected in the not-too-distant future. Results clearly indicate that storm surge risk exceeds tsunami risk for the inner part of the bay bordering the population centers of Nagoya, Kinuura Port and Mikawa Port.

A historical comparison of water levels in Osaka Bay from major tsunami and storm surge shows that average water levels from storm surge are higher than those from tsunami. The comparison does not account for return period, but that in no way suggests that storm surge risk is less than tsunami risk.

Figure 1: Comparative Rise in Sea Level due to Tsunami and Storm Surge



Source: Ministry of Land, Infrastructure, Transport and Tourism

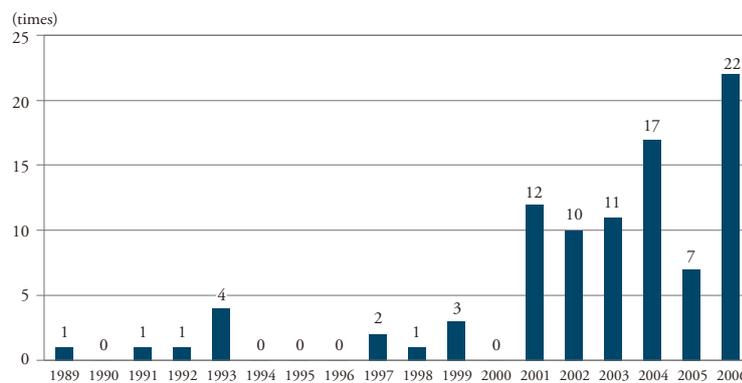
Of course, both tsunami and storm surge are phenomena that cause the sea level to rise; however, in the case of storm surge, it is accompanied by the strong winds that drive the high waves. In other words, during storm surge there is not only inundating



flood caused by the rise in water level but also inundating waves accompanied by the high seas. Caution is therefore necessary, because there are cases in which facilities behind a seawall are damaged even when the storm surge does not overrun the seawall.

Let’s consider the impact of global warming on storm surge damage. Observations show that the sea level on the coast of Japan is still rising, having risen by 7cm from 1980 to 2000. Hiroshima Bay is not one of the three large bays discussed earlier but it is also an area in which storm surge risk is high. One of the islands in this bay is home to Itsukushima Shrine, a world cultural heritage site. This shrine was first built in the 6th Century, and took on its current form in the 12th Century. Covered with primitive religious relics, the entire island was revered as an island of the gods. Many of the shrine’s cloisters were constructed in the intertidal zone of this site, avoiding construction on the island due to its sacred nature. Consequently, the shrine’s cloisters have experienced frequent storm surge damage and have recorded many flood events in recent years. Itsukushima Shrine’s cloisters were flooded up to four times annually during the 1990s, and even more frequently during the 2000s; flooding occurred 22 times in 2006. Global warming is likely one of the factors.

Figure 2: Instances of Flooding at Itsukushima Shrine’s Cloisters



Source: Ministry of Land, Infrastructure, Transport and Tourism

Given that the Intergovernmental Panel on Climate Change (IPCC) Fourth Assessment Report projects that sea level will rise by a maximum of 59cm in 100 years, it is estimated that zero-meter zones around Japan’s three large bays will increase by 50% due to the rise in sea level. More than 4 million people now live in zero-meter zones, and this number is estimated to increase to around 6 million. The IPCC Fifth Assessment Report indicates the possibility that sea level will rise by a maximum of 82cm by the end of the century due to global warming. This estimate exceeds the 59cm in the IPCC Fourth Assessment Report, leading to concern that rising sea levels in the future will increase storm surge risk.

3. Hazardous Effects of Global Warming

The policyholders of non-life insurance companies tend to be concentrated in large cities such as Tokyo, Osaka and Nagoya, which are all located beside the inner part of bays, so increased storm surge risk due to global warming will significantly impact insurance losses. IPCC forecasts that radiative forcing will increase from 3.0W/m² in 2011 to 8.5W/m² in 2100. Applying this forecast to formulas presented by research over the past several years suggests that the central pressure of a typhoon may rise by 18%. Future forecasts for typhoons must therefore take both the rise in water level and the increase in typhoon intensity into account.

The storm surge models of the three large bays created by Japan's national and local governments are based on incidents of extensive damage in the past from typhoons with intensity in the same class as Typhoon Vera and the Muroto Typhoon, and take into account the changes in sea level due to global warming described by the IPCC Fourth Assessment Report. At the same time, the scenario for Osaka Bay uses the pressure of Typhoon Nancy (the Second Muroto Typhoon), which made landfall near Okinawa, to account for climate change. The models for Tokyo Bay and Osaka Bay use the respective worst-case scenario path for each model, while the models for Ise Bay make assumptions about the path of the typhoon by area because of the complex shape of the bay.

InterRisk Research Institute & Consulting quantitatively analyzed risk of storm surge in Japan's three large bays using the Japanese government's hazard mapping methodology, while also reflecting the impact of global warming on typhoon intensity and sea level. Case 1 is the worst-case scenario given current weather. Case 2 is a scenario that applies the effect of global warming on sea level as described in the IPCC Fifth Assessment Report to Case 1. Case 3 also considers greater typhoon intensity resulting from increased radiative forcing in addition to the higher sea level in Case 2.

Table 1: Case Study Parameters

Case Study	Sea Level Used	Typhoon Intensity
Tokyo Bay	Case 1	H.W.L.
	Case 2	H.W.L.+0.82m
	Case 3	H.W.L.+0.82m
Ise Bay	Case 1	H.W.L.
	Case 2	H.W.L.+0.82m
	Case 3	H.W.L.+0.82m
Osaka Bay	Case 1	H.W.L.
	Case 2	H.W.L.+0.82m
	Case 3	H.W.L.+0.82m

H.W.L. – High Water Level

We evaluated the impact of global warming on storm surge risk based on inundation area. Global warming increased inundation in all three large bays, and the increase in Ise Bay was the most striking. The rate of increase in inundation area compared with cases that did not take global warming into account was greatest for Tokyo Bay. Comparing the increase in inundation area as a result of global warming to the pre-global warming cases, the rate was over 50% higher for Tokyo Bay and about 40% higher for the three large bays overall. The rate of increase in inundation area was greater



with the impact of increased radiative force (variance between Case 2 and Case 3) than with the impact of higher sea level (variance between Case 1 and Case 2), which elucidated the need to calculate for radiative forcing in evaluating storm surge risk that reflects the impact of global warming.

This analysis does not take seawall breaches into consideration. It is obvious that damage would be even more serious in the event of a seawall breach.

Figure 3: Result of Storm Surge Analysis for Each Case Study

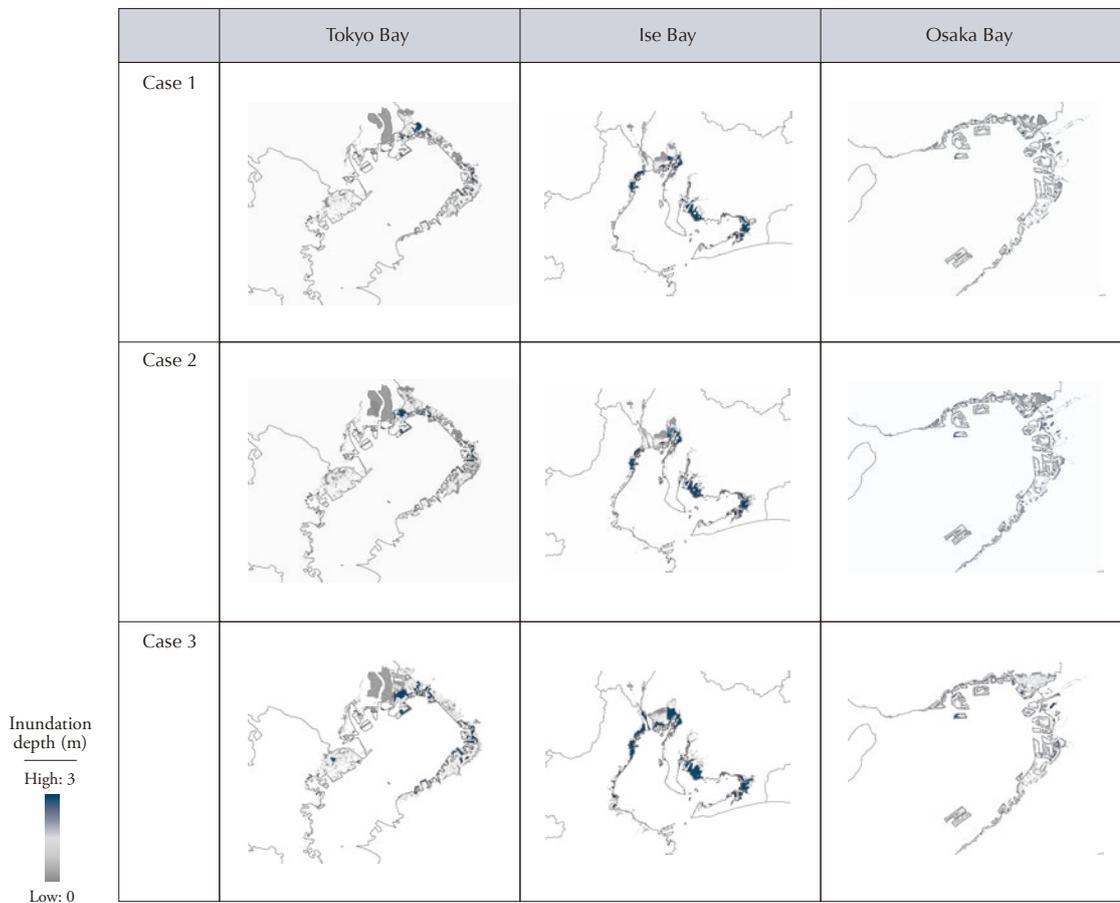


Figure 4: Inundation Area for Each Case Study

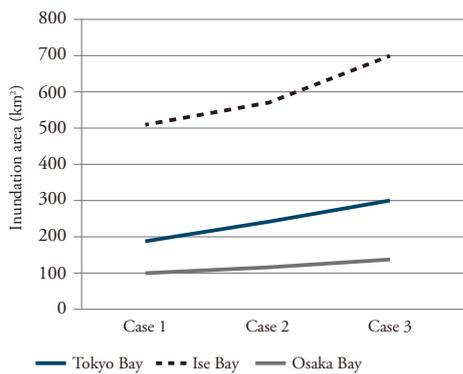
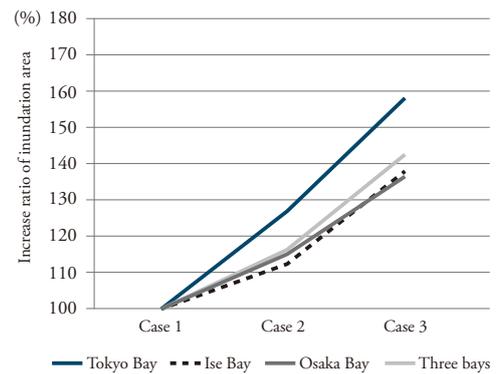


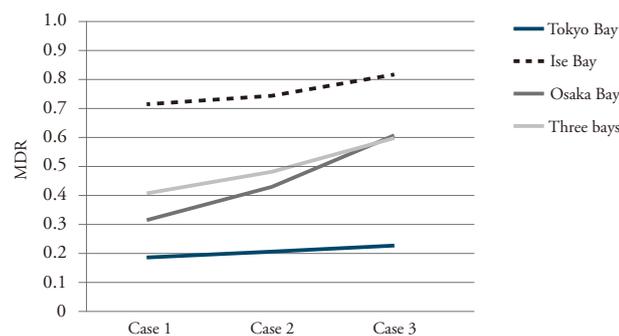
Figure 5: Increase Ratio of Inundation Area for Each Case Study



4. The Impact of Global Warming on Cargo Containers

Cargo owners can transfer storm surge risk on cargo because non-life insurance companies provide insurance products that cover damage from seawater inundation. Many container yards are located in the inner part of bays where storm surge risk is particularly high, and historically have suffered storm surge damage. Sophisticated methods to evaluate storm surge risk for cargo containers and risk map databases are therefore required. InterRisk Research Institute & Consulting has developed a tool for estimating cargo container damage rates from depths of storm surge inundation in order to evaluate the vulnerability of cargo containers to storm surge risk. Variations in mean damage ratio (MDR) for cargo containers at container terminals in each of the cases in Figure 4 above were analyzed using this tool. The results indicate that storm surge risk for containers at Osaka Bay was highest among the three large bays regarding the impact of global warming. MDR for the three large bays as a whole was about 0.44 for Case 1 and rose to 0.6 for Case 3. In other words, storm surge risk increased 37% as a result of global warming.

Figure 6: Container Storm Surge Risk for Each Case



Conclusion

This report discusses public awareness and actual status of storm surge risk in Japan. Japan seems to be safe because it is ringed with seawalls. Many large cities, however, are located in broad zero-meter zones, and flood damage will be extensive if seawalls are swamped or breached. The report also discusses phenomena considered to be the impact of global warming, which have become more apparent over the past several years. Global warming does not just involve rising sea level; it also triggers increased storm surge risk because it increases the intrinsic typhoon intensity. We are likely to experience more frequent and more powerful storm surges in the near future. Therefore, in the opinion of the author, non-life insurance companies need to prepare reflecting the impact of global warming in calculating typhoon risk on their own portfolios.

Several issues are impacting public awareness of storm surge risk. The modeling methodologies for storm surge hazard maps that Japan's national and local governments are preparing are not consistent. Therefore, the increase in the intrinsic typhoon intensity and recent rises in sea level are not always incorporated in global warming assumptions in each modeling methodology. The Japanese national and local governments need to be more consistent in their modeling methodologies and need to promote greater public awareness and understanding of the risk of storm surge.

Concern of Japanese people has heavily focused on tsunami risk since the Great East Japan Earthquake, but hopefully will turn at least slightly to storm surge risk. We must not forget that we are exposed to storm surge risk, and we must recognize that tsunami countermeasures alone do not sufficiently address storm surge risk.



5.

Trends in Japan's Non-Life Insurance Industry

Underwriting & Planning Department

The Toa Reinsurance Company, Limited

1. Trends in Business Results of Non-Life Insurance Companies for Fiscal 2015

Fiscal 2015 results for Japan's non-life insurance companies were solid. An overview of the results of the 26 non-life insurers is as follows:

Net premium income in all lines of business increased to 8,359.7 billion yen, up 276.6 billion yen from the previous fiscal year, due to factors including measures to increase the profitability of automobile insurance and a surge in demand prior to fire insurance product revisions in October 2015.

In addition, net claims paid decreased by 36.6 billion yen to 4,568.9 billion yen. This was because significant claims had been paid in the previous fiscal year due to the heavy snowfall in February 2014. As a result, the loss ratio for fiscal 2015 improved by 2.4 percentage points to 59.9%.

Expenses rose by 80.4 billion yen to 2,681.5 billion yen year on year because higher premium income increased agency commissions. Net expense ratio decreased slightly by 0.1 percentage points to 32.1%.

On the other hand, underwriting profit (earned incurred basis) decreased by 28.5 billion yen to 114.8 billion yen because of the increase in underwriting reserve.

Ordinary profits, calculated as the sum of underwriting profit and investment profit, increased 47.9 billion yen to 794.7 billion yen.

After deducting tax expense of 164.6 billion, net income increased 191.1 billion yen year on year to 569.9 billion yen.

2. Trends in the Non-Life Insurance Industry

(1) Overview of the Non-Life Insurance Industry

Japan's non-life insurance industry comprises 26 Japanese non-life insurance companies that are members of the General Insurance Association of Japan (GIAJ) and 21 companies that are members of the Foreign Non-Life Insurance Association of Japan, Inc. (FNLIA). Currently, Japan's non-life insurance market is an oligopoly in which the top three non-life insurance groups (MS&AD Insurance Group Holdings, Inc., Sompo Japan Nipponkoa Holdings, Inc. (hereinafter abbreviated to "SOMPO HOLDINGS") and Tokio Marine Holdings, Inc.)¹ account for more than 85% of net premium income of GIAJ member companies as a whole.

Note: 1. Presented in alphabetical order

Japan's non-life insurance companies have increased operating efficiency since liberalization in 1996, and have conducted mergers and business integration since 2000. As a result, the average underwriting expense ratio (other than commission and brokerage) for GIAJ member companies has decreased to 14% for fiscal 2015, compared with 21% for all companies in the industry for fiscal 1995, prior to liberalization.

Recent trends among the top three non-life insurance groups are as follows.

MS&AD Holdings operates under a framework of two core non-life insurance companies consisting of Mitsui Sumitomo Insurance Co., Ltd. and Aioi Nissay Dowa Insurance Co., Ltd., which was created through the merger of Aioi Insurance Co., Ltd. and Nissay Dowa General Insurance Co., Ltd. in October 2010.

With respect to SOMPO HOLDINGS, Sompo Japan Insurance Inc. and NIPPONKOA Insurance Co. Ltd., were merged into Sompo Japan Nipponkoa Insurance Inc. in September 2014, forming the largest non-life insurance company in Japan in terms of non-consolidated premium income.

With respect to Tokio Marine Holdings, Tokio Marine & Nichido Fire Insurance Co., Ltd was created through the 2004 merger of Tokio Marine and Fire Insurance Co., Ltd. and Nichido Fire and Marine Insurance Co., Ltd. Tokio Marine Holdings subsequently integrated its management with Nisshin Fire & Marine Insurance Co., Ltd. in 2006.

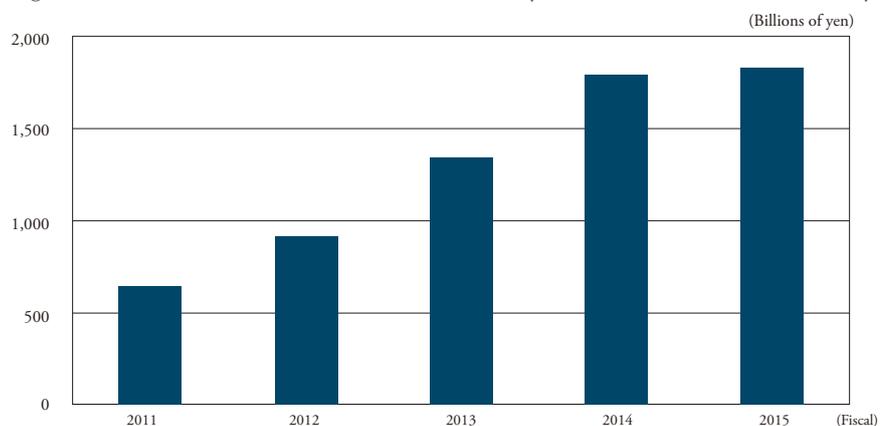
(2) Expansion of Overseas Business

Organic growth in the Japanese non-life insurance market is not likely due to factors such as the low birth rate and aging of society. The top three non-life insurance groups have all positioned overseas business as a growth driver, and are aggressively implementing initiatives such as forming business alliances with local insurance companies and engaging in M&A.

Figure 1 shows overseas premium income for each of the top three non-life insurance groups. Over the past several years, overseas net premium income² for the top three non-life insurance groups has been trending upward, and fiscal 2015 overseas net premium income was about three times that of fiscal 2011. As a result, the overseas businesses of the top three groups now represent about 15% of total net premium income.

Note: 2. The total of net premium income from non-life insurance and life insurance premiums.

Figure 1: Overseas Net Premium Income for the Top Three Non-Life Insurance Groups



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

MS&AD Holdings acquired the general insurance operations in Asia of U.K. company Aviva plc in 2004, and used it as its base for advancing into the ASEAN region. Moreover, in February 2016 MS&AD Group completed its acquisition of Amlin plc of the United Kingdom, thus strengthening its reinsurance business.

SOMPO HOLDINGS acquired leading U.K. specialty (re)insurer Canopus Group Limited in May 2014, thus expanding its international business significantly. In addition, it restructured its reinsurance business in November 2015 by consolidating group reinsurance operations within Sompo Canopus AG.

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 Corporation 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.

Table 1: Overseas Business Development among Japan's Top Three Non-Life Insurance Groups(2015-2016)

Month/Year	Name of Company	Contents
February 2015	Tokio Marine & Nichido	Entered a business relationship agreement with South African company Hollard Insurance Company Limited
April 2015	Aioi Nissay Dowa Insurance Company of Europe	Acquired shares of Box Innovation Group Limited, a major U.K. telematics' auto insurance company
July 2015	Mitsui Sumitomo Insurance	Invested in Sri Lanka's largest insurance group
October 2015	Tokio Marine & Nichido	Completed acquisition of HCC Insurance Holdings, Inc.
November 2015	SOMPO HOLDINGS	Consolidated reinsurance business within Sampo Canopus AG
December 2015	Mitsui Sumitomo Insurance	Increased ownership of Indian joint-venture company
February 2016	Mitsui Sumitomo Insurance	Completed acquisition of Amlin plc of the United Kingdom
April 2016	Aioi Nissay Dowa Insurance	Established a new U.S. subsidiary for research and investigation for advanced automotive technology
April 2016	Aioi Nissay Dowa Insurance Services USA Corporation	Established joint telematics auto insurance services company in the United States
May 2016	Tokio Marine Asia Pte. Ltd.	Increased shareholdings in Bao Viet Tokio Marine Insurance
June 2016	Sampo Holdings (ASIA)	Entered into a non-life bancassurance partnership with CIMB Group

Source: Compiled from press releases from each company. Company names are abbreviated.

Note: 3. Telematics automobile insurance has premiums that reflect analysis of driver behavior and measurement of driving distance.

3. Product Trends

(1) Automobile Insurance

An increase in accidents caused by older drivers and lower automobile use among the young was a key factor reducing profits in Japan's automobile insurance business. In recent years, non-life insurers have therefore moved to revise their automobile insurance products, including rates, to improve earnings.

With product revisions driving gains in automobile insurance profitability, the results of non-life insurers remained firm in fiscal 2015.

At the same time, significant technological advances in the automobile industry are likely to cause major changes over the medium and long term in the operating environment and risks of the Japanese automobile insurance industry.

Anticipating innovation in the automobile industry, major non-life insurance companies are collaborating with automobile manufacturers to use telematics and

sophisticated safety technologies in automobile insurance. Moreover, non-life insurance companies may well accelerate various research activities and infrastructure development to address the advance of futuristic autonomous vehicle technologies.

Autonomous vehicles should reduce traffic accidents and congestion. The world's automobile manufacturers are competing intensely to develop this technology, with several now conducting road tests.

(2) Fire Insurance

The General Insurance Rating Organization of Japan raised reference loss cost rates⁴ in July 2014 since fiscal year 2004. Non-life insurance companies then revised fire insurance premiums from October 2015.

The recent revision mainly reflected an increase in payout of insurance benefits for wind, hail and snow damage. Non-life insurance companies raised premiums by a nationwide average of 2 to 4%.

In addition, the maximum term of 36 years for long-term contracts has been reduced to 10 years. Evaluating long-term fire insurance risks has become more difficult because global warming increased uncertainty in predicting future natural disaster risks.

Note: 4. The General Insurance Rating Organization of Japan calculates the portion equivalent to the net premium and provides the reference loss cost rates to non-life insurance companies.

4. Trends in Regulation by Regulatory Agencies

(1) Risk Management among Insurance Companies

The revised Insurance Core Principles (ICPs) adopted by the International Association of Insurance Supervisors (IAIS) in October 2011 specified the implementation of Own Risk and Solvency Assessment (ORSA) practices. As a result, the introduction of ORSA-related regulations and systems is progressing internationally. In Japan, the Financial Services Agency (FSA) has been conducting enterprise risk management (ERM) hearings with certain insurance companies since 2011. In February 2014, the FSA revised its Comprehensive Guidelines for the Supervision of Insurance Companies to incorporate items related to ERM, including ORSA. Moreover, from fiscal 2015 all Japanese insurance companies are obligated to submit ORSA reports, which the FSA uses to check the status of insurance company ERM, including ORSA.

Another major FSA initiative involves examining economic value-based evaluation and supervision methods. The FSA has been preparing for the introduction of an economic value-based solvency regime by conducting field tests (currently, insurers and reinsurers undergo the third test). The FSA is taking the issues it confirmed with the field tests into account as it proceeds with studies for formulating a definite regime. The timeframe for introducing a definite economic value-based solvency regime has not yet been announced, but the FSA is expected to develop the new regime while studying trends at the IAIS and the International Accounting Standards Board.

(2) Regulations for Insurance Sales Representatives

One of the amendments to the Revised Insurance Business Act, enacted in May 2016, introduces an "obligation to confirm customer intentions" and an "obligation to provide information" about products for comprehensive insurance agencies that sell



the products of multiple companies and engage in comparison selling.

Restructuring the regulations for insurance sales representatives to allay criticism of comprehensive agencies that advocate neutrality but sell the products that generate high commissions from insurance companies is a means to ensure public trust in the insurance system and protect policyholders.

5. Major Natural Disasters

Losses from major natural disasters in Japan in recent years are as follows.

(1) Typhoon Goni in 2015

Typhoon Goni lasted from August 24 to August 26, 2015 and caused extensive damage in Western Japan. According to GIAJ, payout of insurance benefits for Typhoon 15 (Goni) totaled 164.2 billion yen, which historically was the fourth largest payout for typhoon damage.

(2) The 2016 Kumamoto Earthquake

Two large-scale earthquakes struck Kumamoto Prefecture on April 14 and April 16, 2016. The earthquake on April 14 was a foreshock with a magnitude of 6.5, and the main earthquake on April 16 had a magnitude of 7.3. A string of inland earthquakes with magnitudes of 6.5 or more occurred for the first time in Japan Meteorological Agency's recorded history, which expanded the damage from the earthquakes.

Payout of earthquake insurance benefits to dwellings⁵ as a result of the Kumamoto Earthquake had already reached 328.5 billion yen as of June 27, 2016. This amount exceeds the 78.3 billion yen for the Great Hanshin-Awaji Earthquake in 1995, and is second to the 1,265.4 billion yen for the Great East Japan Earthquake in 2011.

Note: 5. Earthquake insurance on dwelling risk in Japan is an optional rider attached to a fire insurance policy, and pays out insurance benefits for damage from earthquakes, volcanic eruptions or resulting tsunami. Payout of earthquake insurance benefits can be huge. The system is therefore structured so that the government and non-life insurance companies share insurance liabilities capped at 11.3 trillion yen per disaster.

The increased payout of insurance benefits for the Kumamoto Earthquake is backed by the higher penetration of earthquake insurance as a result of the Great Hanshin-Awaji Earthquake and the Great East Japan Earthquake. In Kumamoto, the epicenter of the damage, the penetration ratio of earthquake insurance in 1995 when the Great Hanshin-Awaji Earthquake occurred was 5.8%, but rose by about five times to 28.5% in 2014.

Japan has a public-private earthquake insurance system that has the goal of "helping to contribute to the stability of the lives of disaster victims of an earthquake." To achieve this goal, Japanese insurance companies are accelerating the payout of earthquake insurance benefits following earthquakes by immediately strengthening their loss service organization in ways such as adding personnel to handle insurance payouts and simplifying insurance claim procedures.



6. Trends in Japan's Life Insurance Industry

Life Underwriting & Planning Department

The Toa Reinsurance Company, Limited

1. *General Topics Related to the Life Insurance Market*

Negative Interest Rates

The Bank of Japan decided to introduce a negative interest rate policy on January 29, 2016. The negative interest rate policy led market interest rates lower, which began to impact single-premium insurance products, which are the flagship savings-type products of life insurance companies.

For single-premium products, insurance companies receive the full amount of the premium at one time before the date of issue, and they primarily invest these premiums in ultra-long-term government bonds. The Bank of Japan's decision to implement a negative interest rate policy has driven government bond interest rates down further, which presents insurance companies with difficulties ensuring the yield (or the expected rate) they have promised policyholders. Therefore, a number of companies decided to drop expected rates for single-premium whole life insurance. Further, for single-premium endowment insurance and single-premium individual annuities, insurance companies need to invest their premiums in fixed-term government bonds with lower interest rates due to the shorter investment period for these products compared with single-premium whole life insurance. Under such circumstance, it is quite difficult to ensure the yield, therefore some companies have stopped sales of these products.

Regardless of whether they are single premium payments or equalization payments, holding government bonds as assets that match the duration of liabilities is a fundamental approach to manage long-term liabilities for life insurance companies. However, the negative interest rate policy has led market interest rates lower, making it difficult to ensure an interest rate from government bonds that exceeds the expected rate. Given these conditions, insurance companies have rushed to diversify investment management to include foreign bonds with higher interest rates and investments in growth areas such as environment-related and infrastructure businesses.

Life insurance companies struggled with negative spreads in the 1990s following the collapse of Japan's bubble economy. Attention has now turned to how life insurance companies will handle the low market interest rates that have resulted from the current negative interest rate policy.

2. *Overview of Business Results for Fiscal 2015*

The fiscal 2015 business results for 41 life insurance companies are as follows:

(1) Total Amount of New Business

In the fiscal year ended March 31, 2015, the total insured amount of new business increased for individual life, health, and annuity because of the popularity of products denominated in foreign currencies with favorable yields amid continued low interest rates. Additionally, in the fiscal year ended March 31, 2016 the total insured amount increased by 2.8% to 69.3 trillion yen for individual life and health because of the same factor to 2015, while it decreased by 3.5% to 8.3 trillion yen for individual annuity because several companies stopped selling single-premium annuities as the investment environment deteriorated due to the introduction of negative interest rates.



3. Trends in the Life Insurance Industry

(2) Total Amount of In-force Business

The total insured amount of in-force business for individual life and health increased by 0.1% compared with the previous fiscal year to 858.6 trillion yen, with growth in new business offsetting factors including cancellations. For individual annuity, the amount decreased by 0.5% to 103.6 trillion yen, which was the first decrease in 13 years, mainly due to lower sales of single-premium annuities.

(3) Premium Revenues and Total Assets

Total premium revenues increased by 0.7% compared with the previous fiscal year to 39.0 trillion yen, with the popularity of insurance products denominated in foreign currencies offsetting lower sales of single-premium annuities. Total assets were almost unchanged at 367.2 trillion yen.

(1) Privatization of Japan Post Insurance

① Japan Post Group Listings

Three Japan Post Group companies listed their shares on the Tokyo Stock Exchange on November 4, 2015: Japan Post Holdings, Japan Post Bank and Japan Post Insurance.

The Japan Post Group has finally started to move forward with privatization, 10 years after postal reform began in 2005 during the Koizumi administration. Privatization of postal infrastructure, including related operations such as postal services, the postal savings system and postal insurance, is part of a global trend. Deutsche Post of Germany listed its shares in 2000, as did Royal Mail Group of the United Kingdom in 2013.

Japan Post Group has consolidated total assets of nearly 300 trillion yen. The 2015 listing was the third largest in the history of Japan's stock market, following the large-scale public offerings of NTT in 1987 and NTT Docomo in 1998. Moreover, the listing of the three companies on the First Section of the Tokyo Stock Exchange went smoothly, with prices closing higher than the initial offering prices for all three.

However, the enthusiasm for the listings came to an end. Japan Post Group listed company share prices have been declining in tandem with wild fluctuations in stock prices in markets worldwide since the beginning of 2016. Moreover, due to the introduction of a negative interest rate policy by the Bank of Japan on January 29, 2016, reduced investment incomes are expected. The operating environment remains challenging, and attention is now focused on the post-privatization growth strategies presented by Japan Post Group companies.

② Japan Post Insurance Trends

Japan Post Insurance has an exceptionally broad network because it uses the approximately 24,000 post offices (as of April 30, 2016) throughout Japan as a sales channel. It therefore has a powerful customer base, and was one of the leading life insurance companies in Japan with premium and other revenues totaling approximately 5.4 trillion yen in fiscal 2015.

Japan Post Insurance was created in 2007 through the privatization and corporate separation of Japan Post. However, since privatization, strict restrictions limiting the insurance amount per person and the scope of operations have remained. Under these circumstances, the basic product lineup it had during the postal insurance era before privatization has been maintained, therefore the number of policies in force has been trending downward because of diversifying customer needs.

The 2015 public offering started Japan Post Insurance on the road toward its long-sought goal of true privatization. Japan Post Group's medium-term management plan is titled "New Japan Post Group Network Creation Plan 2017." Its strategies for Japan Post Insurance are to establish the financial management base that will be necessary for growth, develop products and services to enhance its strengths, and aim for the reversal of the decreasing trend of policies in force after the final fiscal year of the Medium-term Management Plan (FY2018/3). This suggests various plans will be formulated to achieve targets in the future. As one plan to diversify revenue sources, on March 11, 2016 Japan Post Insurance obtained a license for the reinsurance of the policies that Japan Post Insurance and Japan Post sell as sales agents for other life insurance companies. In addition, on March 29, 2016 Japan Post Insurance concluded a business alliance with The Dai-ichi Life Insurance Company, Limited with the goal of building a complementary relationship in areas such as the overseas life insurance business and asset management.

The constraints on Japan Post Insurance have been relaxed in conjunction with the public offering. On April 1, 2016, the limits on the insurance amount per person were revised for the first time in 30 years, and the cumulative limit of 13 million yen increased to 20 million yen. Limits on the scope of business expansion and other restrictions will likely ease if Japan Post Insurance is seen as competing fairly with the other private life insurance companies.

Japan Post Insurance used to be subject to a wide range of restrictions, but its proactive initiatives after privatization will bring intensified competition in the market. The impact of privatization of Japan Post Insurance on Japan's life insurance market requires attention.

(2) Acquisitions by Large Life Insurance Companies

Japan's population is currently over 120 million, but is decreasing due to the low birthrate and is estimated to fall to 100 million in 2045. Japan's population is also aging, with the current high ratio of one in four people age 65 or older forecast to rise to about one in three in 2035. Japan's life insurance market is contracting because of the aging of society and the low birthrate. Individual policies in force in fiscal 2014 for principal products including death benefit products and health insurance totaled 857 trillion yen, which was 43% below the historical high in fiscal 1996.

With the Japanese life insurance market forecast to contract further due to the aging of society and low birthrate, large Japanese life insurance companies have been energetically advancing outside Japan.



Large Japanese life insurance companies have been exploring overseas business development by investing in life insurance companies in emerging countries in Asia with growing populations and low life insurance penetration rates. However, these investments have been limited to small amounts because capital restrictions on foreign investment are stringent in Asia.

On the other hand, in 2015 Japanese life insurance companies announced a succession of major investments to acquire life insurance companies in developed countries, primarily the United States. These investments are expected to contribute to earnings from the first year after acquisition.

Announced	Acquiring Company	Acquired Company	Country	Acquisition Cost
June 2014	Dai-ichi Life Insurance	Protective Life Corporation	United States	Approx. USD 5,554 million
July 2015	Meiji Yasuda Life Insurance Company	StanCorp Financial Group, Inc.	United States	Approx. USD 4,950 million
August 2015	Sumitomo Life Insurance Company	Symetra Financial Corporation	United States	Approx. USD 3,732 million
October 2015	Nippon Life Insurance Company	The life insurance business of MLC Limited, a subsidiary of National Australia Bank Limited	Australia	Approx. AUD 2,400 million*

*Estimated amount when the press release was issued

Japanese life insurance companies launched into large overseas acquisitions to diversify their revenue base. To secure stable earnings deserving of the massive investments, given that regulations and the market environment differ from those in Japan, the key issue now is how the acquiring companies can increase corporate value by addressing the challenges of cultivating personnel, creating synergies through product development, and managing companies outside Japan.

At the same time, in Japan, Nippon Life has announced the large-scale acquisition of Mitsui Life for approximately 280 billion yen. One objective of this acquisition is to collaborate with Mitsui Life in flexibly providing suitable products to the growing channels of bancassurance and insurance shops. On the other hand, Dai-ichi Life has already launched a subsidiary that specializes in providing protection-type products to these channels. The Japanese market continues to contract due to aging and the low birthrate, therefore these types of acquisitions and alliances aimed at enhancing marketing are likely to continue. Nippon Life's acquisition of Mitsui Life and the privatization of Japan Post Insurance are likely to add momentum to the restructuring of Japan's life insurance companies and the industry as a whole, and future moves among life insurance companies will demand attention.

4. Product Trends

(1) New Products Launched to Support the Treatment of Dementia

The composition of Japan's population has changed, with 26.7% now 65 or older. Japan has become a super-aged society, and the number of people with dementia has been increasing over the past several years as a result. In 2012, 4.6 million people suffered dementia, representing one in seven people age 65 or older. And this number will increase in the future. In 2025, 7 million people are forecast to suffer dementia, representing one in five people age 65 or older.

The public long-term care insurance system in Japan has usage limits according to the extent of long-term care required, and pays 90% of the long-term care costs for dementia patients within these limits. Patients, however, are responsible for 100% of all costs beyond the limits. Dementia has become a social issue in recent years because the costs for treatment and long-term care expenses are rising, and more people are having to leave their jobs because they need to take care of relatives suffering from dementia.

Few patients recover from dementia, and most require long-term treatment. However, early detection and appropriate treatment can ameliorate symptoms and slow the progression of the disease. Consequently, needs have been growing for insurance products that cover costs for treatment and nursing of patients suffering from dementia.

In March 2016, Taiyo Life Insurance Co., Ltd. was first in the industry to sell a dementia-related insurance product that only requires simple declaration to purchase a policy. This product pays a lump sum when a patient is diagnosed with organic dementia, a type of dementia associated with organic changes in the brain, and if the condition persists for at least 180 days. Moreover, this product is a relaxed underwriting type that can be purchased by customers who feel anxiety about their health or have been hospitalized in the past.

Sales of dementia products besides those of Taiyo Life Insurance continue as well, and the market is forecast to expand in accordance with market needs.

(2) Life Insurance Industry Response to LGBT

In April 2016, Shibuya ward in Tokyo began offering a "partnership certificate" in line with its stated goal of realizing a broadly participative society that respects diverse people regardless of gender or other characteristics in which people can fully exercise their individuality and capabilities and share social responsibilities. While this certificate differs from a legally binding marriage certificate, it does place same-sex marriages on the same plane as heterosexual marriages as long as certain conditions are satisfied. This trend mirrors the infiltration of the culture of respect for the individual associated with progress of globalization in recent years. In line with this social development, the life insurance industry has moved forward with initiatives for the LGBT (lesbian, gay, bisexual, and transgender) community. On October 29, 2015, Lifenet Insurance Company announced that it had expanded the range of designated death benefit beneficiaries to allow designation of a same-sex partner. Previously, spouses in a common-law marriage were recognized as beneficiaries under certain conditions, but as a rule beneficiaries were limited to a spouse listed on the family registry or up to a second-degree relative. Lifenet Insurance expanded the scope of designation by applying the treatment for common-law marriages to same-sex partners if certain conditions are satisfied.



Other insurance companies are also expanding LGBT initiatives in ways such as expanding beneficiary designation. Further, some insurance companies started to implement their benefit programs for employees who have a same-sex partner. Not limited to the LGBT issues, the development of new products that address various social needs is expected.

5. Regulatory Trends

Financial Services Agency Permits the Sale of Infertility Insurance

Couples in Japan are increasingly marrying later and therefore having children when they are older, and the number of couples seeking infertility treatment is growing. However, in vitro fertilization and surgical procedures such as sperm extraction frequently cost about 300 thousand yen per procedure. At present, infertility treatments are generally not covered by public health insurance, so they are a heavy financial burden that leads couples to forego having a baby through infertility treatments, thus contributing to the low birthrate.

Since reaching a record 4.54 in 1947, Japan's overall fertility rate has declined rapidly to a record low of 1.26 in 2005. The birthrate subsequently trended upward slightly, but has remained at a low level compared with the rest of the world. Japan's population began to decrease in 2005 as a result. Japan is now an aging society with a declining population. If the low birth rate continues, the nation's GDP will fall because of the decreasing demographic engaged in productive labor. This in turn will reduce the nation's competitiveness. Moreover, a lower GDP will reduce Japan's tax revenue, which will reduce the quality of life and public services.

Japan's declining population has become a social issue. The Abe administration is drafting measures to achieve a target birthrate of 1.8 in 2025 by expanding support for childbirth, including infertility treatment.

Based on these developments, on April 1, 2016 the FSA announced it would permit the sale of insurance products that cover the cost of expensive infertility treatments. A large number of issues must be resolved to develop infertility insurance products, including the differing treatment criteria among medical institutions that provide infertility treatment. However, the economic need to offset large medical expenses for infertility treatments is strong, and infertility insurance is a very socially conscious product. Insurance companies are therefore expected to continue studying the development of infertility insurance products.

Supplemental Data: Results of Japanese Major Non-Life Insurance Companies for Fiscal 2015, Ended March 31, 2016
(Non-Consolidated Basis)

(Unit: Millions of yen, %)

		MS&AD Holdings		Tokio Marine Holdings		Sompo Holdings		Fuji	Toa Re
		Mitsui Sumitomo	Aioi Nissay Dowa	Tokio Marine & Nichido	Nisshin	Sompo Japan Nipponkoa			
Net Premiums Written	Fiscal 2015	1,507,157	1,192,089	2,128,312	138,671	2,218,425	279,178	173,632	
	Fiscal 2014	1,444,176	1,160,867	2,036,790	136,634	1,891,605	278,898	165,497	
Net Claims Paid	Fiscal 2015	800,899	644,889	1,175,089	75,731	1,287,493	137,498	122,580	
	Fiscal 2014	810,853	677,923	1,148,370	77,516	1,125,937	137,273	131,377	
Underwriting Profit (Loss)	Fiscal 2015	19,116	24,881	13,886	7,875	78,284	(12,991)	(8,246)	
	Fiscal 2014	14,000	14,793	59,917	14,748	42,149	(5,220)	(2,231)	
Ordinary Profit (Loss)	Fiscal 2015	167,896	61,771	377,258	9,715	178,086	(7,845)	3,275	
	Fiscal 2014	171,328	68,973	264,085	17,674	166,828	4,780	11,569	
Net Profit (Loss) for the Year	Fiscal 2015	113,970	31,098	301,610	6,147	126,289	(5,446)	2,191	
	Fiscal 2014	89,114	39,480	185,312	12,592	39,348	2,014	2,634	
Total Assets	Fiscal 2015	6,786,590	3,418,516	9,242,545	421,690	7,036,222	849,964	491,993	
	Fiscal 2014	6,790,021	3,470,706	9,078,083	431,903	7,326,234	866,933	489,561	
Ratio 1 Loss Ratio (%)	Fiscal 2015	58.9	59.2	60.0	61.6	63.7	55.4	70.6	
	Fiscal 2014	62.2	63.2	61.3	63.7	65.6	54.8	79.4	
Ratio 2 Expense Ratio (%)	Fiscal 2015	31.0	34.3	30.6	32.7	31.6	42.3	23.7	
	Fiscal 2014	31.8	35.0	30.2	32.6	31.8	37.6	22.8	
Ratio 3 Yield on Investments (Income) (%)	Fiscal 2015	2.40	2.28	4.41	1.41	2.13	1.51	4.01	
	Fiscal 2014	2.44	2.34	3.28	1.42	2.08	1.51	4.12	
Ratio 4 Solvency Margin Ratio (%)	Fiscal 2015	585.9	829.3	746.3	1,127.7	729.3	919.5	792.0	
	Fiscal 2014	651.5	804.9	751.7	1,064.5	716.3	939.9	851.4	

Sources: Each company's financial statements of Fiscal 2015

Notes 1. Sompo Japan Nipponkoa Holdings, Inc. will change its name to Sompo Holdings, Inc. on October 1, 2016.

2. Sompo Japan Nipponkoa's data for Fiscal 2014 in "Japan's Insurance Market 2015" does not match the above data for Fiscal 2014. This is because Sompo Japan and Nipponkoa merged to become Sompo Japan Nipponkoa Insurance Inc. on September 1, 2014, and Sompo Japan Nipponkoa's data in "Japan's Insurance Market 2015" did not reflect a consolidated adjustment account between two companies.

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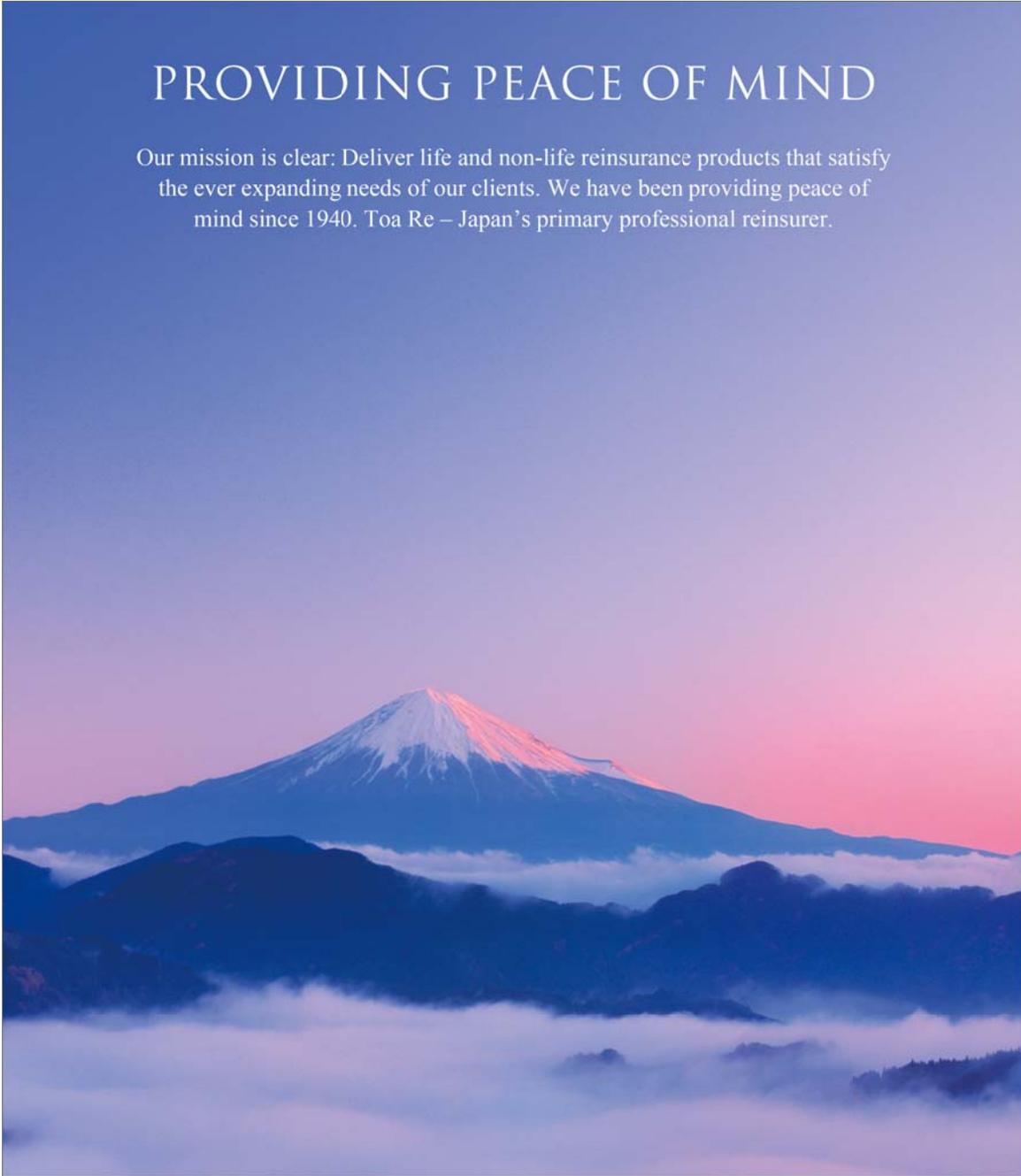
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