

Japan's Insurance Market 2018

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To Our Clients

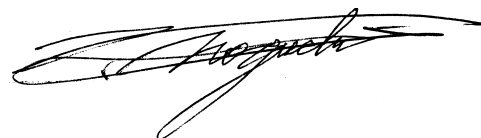
It gives me great pleasure to welcome you to our brochure, 'Japan's Insurance Market 2018.' It is encouraging to know that over the years our brochures have been well received even beyond our own industry's boundaries as a source of useful, up-to-date information about Japan's insurance market, as well as contributing to a wider interest in and understanding of our domestic market.

In the reinsurance industry, the softening trend of reinsurance premium rates halted to some extent because of the three massive hurricanes in North America and large-scale forest fires in California in 2017. However, fierce competition is continuing among major reinsurance companies to win contracts. Moreover, there is a need to respond to changes in international regulations and frameworks concerning reinsurance and to address issues such as diversification and increasing complexity of risks inherent in insurance products. Thus, the business environment in which the Toa Re Group operates is undergoing major change.

In these circumstances, the Toa Re Group formulated and initiated in April the "Mission 2020" medium-term management plan covering three years from fiscal 2018. In "Mission 2020," our vision is to become "A reinsurance group that keeps being selected by clients across the world and that is developing together with them by providing optimal solutions." In the changing business environment, we will strive to precisely meet clients' reinsurance needs.

The Toa Re Group will do its utmost to fulfill its mission as a reinsurance company "Providing Peace of Mind," as articulated in the ToaRe Mission Statement.

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



Tomoatsu Noguchi

President and Chief Executive
The Toa Reinsurance Company, Limited



Civil Liability for Automated Driving Systems in Japan

1

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1. Foreword

The development of automated driving systems has made remarkable progress in recent years, and progress in Japan is representative. Automated driving systems can be categorized into several levels, ranging from partial assistance for driving operation to full driving automation. Japan generally adheres to the Society of Automotive Engineers (SAE) International J3016 levels 0 to 5. Japan will have a transition period from around 2020 to 2025 during which automated level 0 to level 4 vehicles will share the road. (In this paper, “transition period” refers to such a period.)

The Ministry of Land, Infrastructure, Transport and Tourism established a research group of experts, and in November 2016 began examining how civil liability would apply during the transition period. The group met six times and published its report in March 2018. The Japanese government incorporated the results of this report in its “Government Policy Outline for Improvement of Automated Vehicles” (the basic policy for promoting and developing automated vehicles), which was finalized in April 2018. The conclusions of the research group therefore became the national civil liability policy for automated vehicles.

I was involved in preparing the report as the chairman of the research group. This paper introduces the key points of the research group’s deliberations on civil liability.

2. Current Civil Liability Incurred in Automobile Accidents

Automobile accidents cause major damage in Japan because of the widespread use of automobiles. Human loss, i.e. death and injury, is serious. For example, about 499,000 automobile accidents occurred in 2016. Deaths from automobile accidents peaked at about 16,700 in 1970, and have consistently trended downward since then, but in 2017 there were still 3,650 deaths.

A major development in the legal response to serious automobile accidents came in July 1955 with the enactment of the Automobile Liability Security Act. Prior to this act, automobile accident victims demanding damages bore the heavy burden of proving negligence of the perpetrator. The Automobile Liability Security Act was enacted to eliminate this burden and in effect assigns no-fault liability to the perpetrator.

To elaborate, under the Automobile Liability Security Act it is sufficient for the victim to prove that the damage occurred due to the accident. On the other hand, Article 3 of the act assigns responsibility to the perpetrator for damages, except in the case when all of the following three exemption requirements apply: 1) self and driver did not neglect to pay attention to the operation of the automobile; and 2) the actions of the victim or a third party other than the driver were either intentional or negligent; and 3) the automobile had no structural or functional defects. The practical difficulty perpetrators face in substantiating all three of these exemption requirements effectively imposes no-fault liability on the perpetrator.

Article 3 of the Automobile Liability Security Act stipulates “liability of the automobile operator” (the liability of the person who controls and benefits from the operation of the automobile). It certainly made holding perpetrators legally responsible much easier for victims. However, the victim cannot receive compensation if the perpetrator considered responsible lacks the resources to pay damages. In fact, the Automobile Liability Security Act also takes this problem into account. That is,



Article 5 of the act requires automobile owners, including the perpetrator, to have liability insurance, without exception. Compulsory automobile liability insurance ensures that the victim will certainly receive compensation up to the limits of this insurance. At present, compulsory insurance covers a maximum of 30 million yen for death damages, 750,000 yen to 40 million yen for residual disability damages depending on degree, and a maximum of 1.2 million yen for injury damages.

However, liability of the automobile operator covers only human loss caused to the victim, not property damage (damage caused to objects). Therefore, operators must also carry voluntary insurance to cover property loss. In addition, operators should carry voluntary insurance to cover human loss they may cause in excess of the maximum compulsory insurance coverage prescribed by the Automobile Liability Security Act.

3. Key Conclusions of the Research Group

(1) Civil Liability during the Transition Period

As mentioned above, the Automobile Liability Security Act created a two-tiered structure of liability of the automobile operator and compulsory insurance, which has significantly facilitated legal remedy for automobile accident victims. However, the question is whether this remedy mechanism will continue to function satisfactorily during the transition period, i.e., when vehicles of automated level 0 to level 4 share the road. This was the central issue for the research group.

Three contrasting opinions about this question emerged in the research group.

The first opinion was that the existing mechanisms prescribed by the Automobile Liability Security Act can and should remain in force even during the transition period. This opinion holds that liability of the automobile operator can remain relevant even for level 4 automobiles.

The second opinion was that liability of the automobile operator should remain in force, complemented by the creation of a new mechanism that calls on automobile manufacturers and other related parties to pay a certain amount in advance as premiums for automobile liability insurance.

The third opinion was that liability of the automobile operator should remain in force, complemented by a newly established legal concept of a “liability of the system provider” mechanism that assigns no-fault liability to automobile manufacturers and other related parties.

The research group discussed these three opinions and concluded that it would recommend the first. The rationale was that 1) the legal interpretation of “liability of the automobile operator” posed no problems even during the transition period and 2) the existing system should not be drastically overhauled in the transition period, so maintaining the smoothly functioning Automobile Liability Security Act during the transition period was appropriate. The research group also decided that the second and third opinions required the resolution of numerous issues for them to function smoothly, which would not be simple. Moreover, the research group concluded that key countries overseas are not moving toward legal system revisions that assign liability to automobile manufacturers and other related parties for when level 0 to level 4 vehicles share the road.

(2) Ensuring Effective Rights to Compensation from Automobile Manufacturers and Other Related Parties

The research group also considered whether maintaining the existing mechanisms of the Automobile Liability Security Act would pose any particular problems during the transition period. The question was how to strengthen the effective ability of insurance companies that have paid a claim to exercise their right to compensation from automobile manufacturers and other related parties through insurance subrogation, which at present is virtually nonexistent. Vehicles with automated driving systems, by design, decrease the degree of driver involvement, and many accidents would likely be attributed to defects in the automated driving system. However, automobile manufacturers and other related parties would not bear the responsibility they should for automobile accidents due to such defects if insurers cannot exercise their right to compensation from those responsible.

Incidentally, Japanese insurers almost never exercise their right to compensation from automobile manufacturers because product liability suits must prove that the vehicle was defective. That is extremely difficult under the current situation, and will be even more difficult during the transition period. The research group therefore made the following proposals: 1) the installation of an EDR (Event Data Recorder) or other type of similar device that analyzes automobile accidents to elucidate their cause should be mandatory for vehicles; 2) a study should examine the establishment of a cooperative framework that enables insurance companies smoothly to claim compensation from automobile manufacturers; 3) a study should examine the establishment of institutions to investigate the causes of accidents during automated driving and the safety of automated driving systems.

(3) Accidents and Damage Caused by Hacking

The spread of automated vehicles raises the prospect of automobile accidents due to hacking. What is the liability of the automobile operator in such cases?

An accident that results from hacking is an accident caused by a third party (the hacker) who is completely unrelated to the owner. The hacking causes the vehicle to operate counter to the owner's intentions. Liability in this situation is considered similar to that of an accident involving a vehicle that has been stolen by an unrelated third party. Precedent relieves the owner of liability of the automobile operator for accidents involving a stolen vehicle if the owner's oversight of the vehicle was not negligent. Similarly, the owner of the vehicle should not be responsible for an accident caused by hacking.

Incidentally, the Automobile Liability Security Act (Article 72, the latter part of Clause 1) provides for compensation to victims of accidents involving a stolen vehicle, where the owner bears no responsibility, from a government compensation fund. An accident caused by hacking is categorized in the same way as one involving a stolen car, so the government compensation fund should compensate victims of these accidents.



(4) Compensation for Accidents Involving Own Human and Property Damage

The Automobile Liability Security Act does not apply to own human and property damage. The act only applies to third parties involved in accidents, not to automobile operators.

This gives rise to the issue of revising the Automobile Liability Security Act to include own human and property damage resulting from car accidents in its scope of application.

The research group concluded that the Automobile Liability Security Act should remain in force during the transition period without drastic revisions. That is, voluntary automobile insurance such as personal injury and vehicle coverage are available for own human and property damage.

(5) Accidents due to Erroneous External Data including Map and Infrastructure Information or Communication Interruptions

Another question involves accidents that occur because of automated driving system errors due to erroneous external data such as map and infrastructure information or communication interruptions.

In the case of maintaining the existing system of liability of the automobile operator, exemption from liability requires proof that the automobile had no structural or functional defects as per the third requirement covered in section two above. Accidents resulting from external data errors and communication interruptions raise the issue of whether the accident was the result of a structural or functional defect of the vehicle involved.

First of all, automobile manufacturers assume access to external data and communications in designing and manufacturing automated driving systems, and so must also assume the high probability that data errors and communication interruptions may occur during the operation of the automated driving system. Automated driving systems cannot ensure safety if they are unable to handle routinely assumed events, which would make an automated driving system that causes accident due to external data errors or communication interruptions a structural or functional defect of the vehicle.

However, external data errors and communication interruptions may not be a structural or functional defect if they were impossible to predict using engineering knowledge and expertise on automobiles during the design and manufacture of the system.

4. Conclusion

This paper presented the main conclusions of the research group, but they are only relevant for civil liability during the transition period from around 2020 to 2025. Future advances in automated driving technology, the number of automated vehicles on the roads, and discussions in countries other than Japan may require profound examination of civil liability for level 5, full driving automation, in the transition period. Japan will need a new research group to consider this issue in the first half of the 2020s.



Water Risk in Japan

2.

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1. Foreword

On July 5, 2018, the Japan Meteorological Agency held an extraordinary press conference on the emergency of record-breaking heavy rains in western and eastern Japan through July 8 due to the activity of the *Baiu* (rainy season) front, urging caution against landslides, floods and inundation. Although that seemed to have left enough time to evacuate or prepare, the result, however, was a major disaster with more than 220 casualties or people missing. There could be any number of reasons why such a tragedy occurred. The torrential rain fell in locations throughout a wide area from Kyushu to the Shikoku and Chugoku region and the Kinki and Chubu areas. Because Heavy Rain Emergency Warnings were accordingly issued in multiple regions, repeatedly as required, perhaps people didn't sense the urgency of the situation and didn't realize that their current location had been pinpointed as dangerous, making it necessary to evacuate or take other action to avoid danger. Perhaps normalcy bias caused them to optimistically think that even though torrential rain was falling, it would stop soon, just as it always had, and thus they were already running late when disaster was imminent. Moreover, production activities and distribution in the disaster areas have been set back due to disruption of the transportation network in addition to the flooding, and the combined direct and indirect economic damage nationwide should exceed 1 trillion yen.

In recent years, such disasters caused by torrential rain have been striking the Japanese archipelago every year. The Hiroshima sediment disaster occurred in August 2014 in Asaminami-ku and other areas of the city of Hiroshima due to torrential rain measured at 101 mm/hour, which caused landslides that killed 77 people and destroyed 179 residential properties. In September 2015, in a broad area from western to northern Japan heavy rain that occurred from a typhoon and storm front caused the Kinugawa River to overflow and break the dykes in Joso, Ibaraki Prefecture, and damaged an area of about 40 km², or about one third of the city. Seven people died and nearly 20,000 residential properties suffered damage, primarily in northern Kanto and Tohoku. In 2016, Typhoon No. 10 (Typhoon Lionrock), the first typhoon in recorded history to make direct landfall on the Pacific coast of Tohoku, affected various places in Tohoku extending even to Hokkaido. The typhoon caused the Omoto River (Iwaizumi-cho, Iwate Prefecture) to flood, resulting in 27 people either killed or missing and the destruction of more than 500 properties, including the inundation of a group home for the elderly. In July 2017, a *Baiu* front and Typhoon No. 3 (Typhoon Nanmadol) affected areas of western and eastern Japan; while localized torrential rain in northern Kyushu caused 26 deaths and destroyed 98 residential properties.

Has windstorm and flood damage increased, and has anthropogenic climate change, otherwise known as global warming, driven any such increase? This paper briefly covers findings to date.

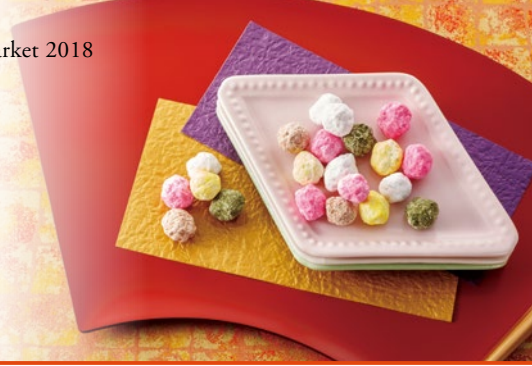
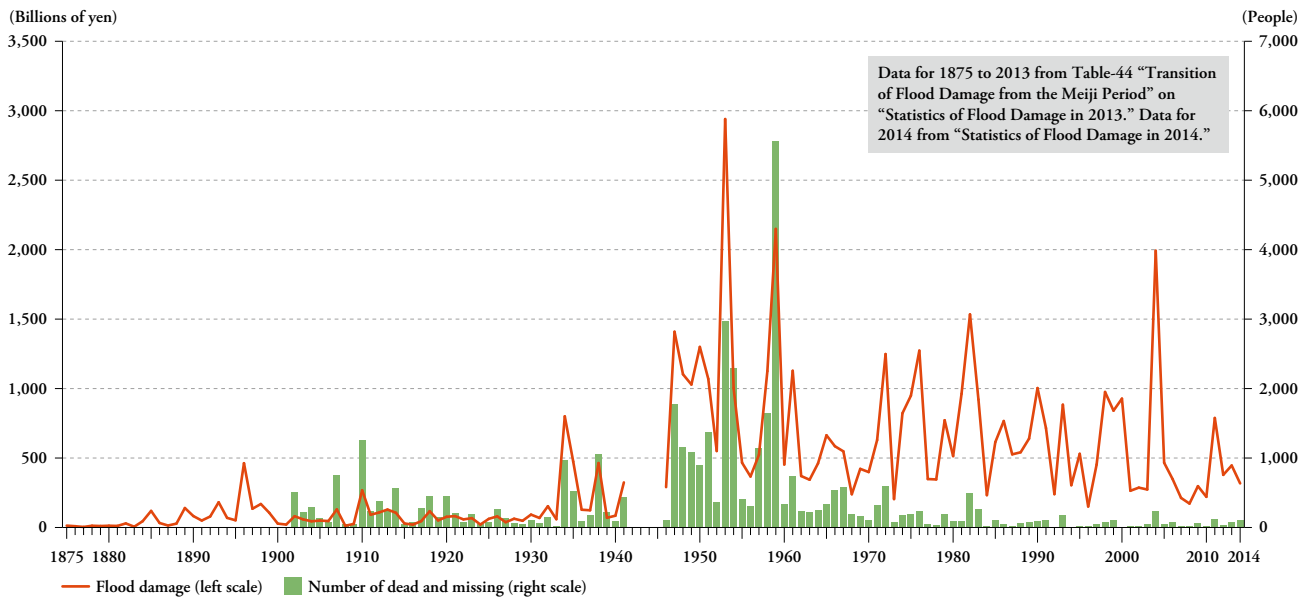


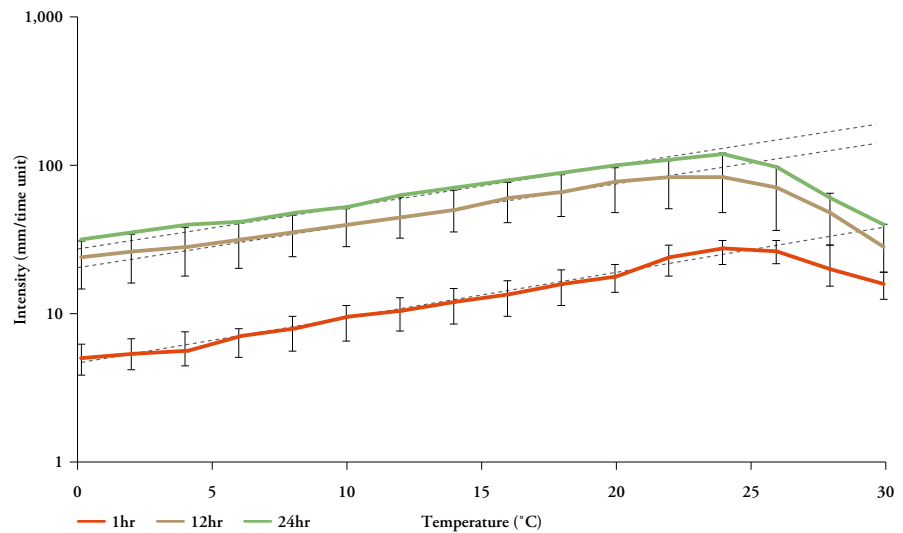
Figure 1: Human and Economic Loss Due to Flooding in Japan – 1875 to 2014 (Using 2005 as a baseline for calculating monetary value)



2. Observed Changes

Is windstorm and flood damage increasing or decreasing? Figure 1 gives a historical picture of human and economic losses caused by windstorm and flooding in Japan. The bar graph indicates that deaths from flooding and storm surge have gradually decreased since peaking in 1959 with the Isewan Typhoon (Typhoon Vera), which killed more than 5,000 people. In the 21st century, up until the devastating heavy rains of July 2018, the heaviest human loss in a single year occurred in 2004 when torrential rain in Niigata and Fukushima, heavy rain in Fukui, and Typhoon No. 23 (Typhoon Tokage) killed more than 200 people in total, which was significantly higher than the death toll from the Niigata Chuetsu Earthquake in the same year. At the same time, the graph shows that economic loss (using 2005 as a baseline for calculating monetary value) from windstorm and flood damage has essentially been flat over the past 40 years after averaging out heavy inter-annual variations, and was lower than the losses from the major typhoons that frequently occurred immediately after World War Two. One explanation is that disaster prevention facilities have improved and the risk of human life loss was reduced compared with the era when the disaster prevention social infrastructure was not as well developed and vulnerability was higher. However, assets have become more concentrated in areas that are inherently vulnerable to windstorm and flood damage, which has increased risk exposure and kept economic loss apart from decreasing significantly.

Figure 2: The Relationship between Temperature and Precipitation



Note: Daily mean temperature and 99th percentile precipitation in Japan for hourly, 12 hourly, and 24 hourly temporal scales (Utsumi et al., 2011). Based on AMeDAS raingauge network of Japan Meteorological Agency.

Are heavy rains and flooding occurring as frequently as ever? Unfortunately, yes – in fact, they are more frequent. Figure 2 shows the relationship between the daily mean temperature and the intensity of the 99th percentile precipitation level in Japan for hourly, 12 hourly, and 24 hourly temporal scales (Utsumi et al., 2011).

The solid lines in the graph illustrate the slope of the saturation water vapor pressure, which is the maximum water vapor content that the atmosphere can hold. The observed intensities rise about 7% for every 1 degree increase in temperature up to about 10 to 20 degrees, at approximately the same slopes for each of the temporal scales, as the solid lines show. (In this paper, “degrees” refers to degrees Celsius.) Moreover, observed rain intensities peak at an average daily temperature of around 25 degrees, but 10-minute precipitation records do not exhibit the peak phenomenon. In other words, Figure 2 shows a clear trend of intense rainfall over short periods on warmer days, but such rainfall is not likely to continue for long.

For example, the temperature in Tokyo rose by about 3 degrees during the 20th century. Global warming is thought to account for about 1 degree of the increase, and the heat island effect the other 2 degrees. Figure 2 does not distinguish between the influences of the two, but whether it is due to global warming or the heat island effect, the likelihood of an increase in the amount of water vapor in the atmosphere rises on warm days. Evidence indicates this will result in increased rainfall intensity over short periods of time. In fact, reports in Japan indicate that the number of days observed with rainfall of 100 mm or 200 mm or more and hours observed with rainfall of 50mm or 80mm or more have increasing trends (Japan Meteorological Agency, 2012).

Working Group I’s contribution to the Fifth Assessment Report (WGI AR5) of the Intergovernmental Panel on Climate Change (IPCC) drew no definitive conclusions about historical changes in tropical cyclones such as typhoons and



hurricanes because of the uncertainty resulting from inadequacies and changes in the observation system. However, the frequency and intensity of the strongest tropical cyclones in the North Atlantic have almost certainly increased. On the other hand, long-term trends for data since 1950 have not been identified, including the overall number of typhoons, the number of strong typhoons, or the proportion of strong to total typhoons.

Extensive reporting on tornados that damaged Tsukuba and other areas in Ibaraki Prefecture and Tochigi Prefecture in May 2012 and on tornado damage in Koshigaya (Saitama Prefecture) and Noda (Chiba Prefecture) in September 2013 led many people to believe that tornados are occurring more frequently in Japan due to climate change. It is more likely, however, that official recognition of tornados has increased because of the installation of a Doppler radar network covering Japan and other factors that have allowed the Japan Meteorological Agency to intensify its investigation into wind gusts since 2007 and to issue tornado warnings from March 2008. Another major factor influencing this perception is the widespread use of cell phones that can shoot video, which has increased the availability of footage for news reporting. In fact, past and present statistics are not really comparable because of differences in type and method of data collected, but certainly up to 30 tornados occurred annually on average in Japan from 1960 to 1990.

Statistics on the long-term trend of lightning strike damage are not available. However, a study of days with lightning (Yoshida, 2002) clearly shows a long-term downtrend during the 20th century in the number of summer days with lightning in northern Kanto, and an uptrend in the number of winter days with lightning along the Japan Sea coast.

3. Claims Paid for Wind and Flood Damage

Japan tends to concentrate provisions for natural disasters almost exclusively on earthquake damage, including tsunami. This is understandable since earthquakes involve greater natural disaster risk of human loss than windstorm and flooding. The Isewan Typhoon (Typhoon Vera) and associated storm surge (the storm with the greatest human toll) resulted in 5,000 missing or dead as introduced above. In comparison, several earthquakes resulted in much greater losses: over 100,000 dead or missing after the Great Kanto Earthquake of 1923; some 6,400 dead or missing after the Great Hanshin-Awaji Earthquake of 1995; and about 18,400 dead or missing after the Great East Japan Earthquake of 2011.

2. Water Risk in Japan

Table 1: 10 Largest Claims Paid for Earthquake Insurance on Dwelling Risks

	Date of Occurrence	Earthquake	Magnitude	Claims Paid (Billions of yen)	For Reference: Percentage of Households with Earthquake Insurance When Earthquakes Occurred in Main Prefectures That Suffered Damage
1	March 11, 2011	Tohoku Earthquake (Great East Japan Earthquake)	9.0	1,274.9	Iwate Prefecture: 12.3% (As of March 31, 2010) Miyagi Prefecture: 32.5% (As of March 31, 2010) Fukushima Prefecture: 14.1% (As of March 31, 2010)
2	April 14, 2016	Kumamoto Earthquake	7.3	375.3	Kumamoto Prefecture: 29.8% (As of December 31, 2015) Oita Prefecture: 23.1% (As of December 31, 2015)
3	January 17, 1995	Southern Hyogo Prefecture Earthquake (Great Hanshin-Awaji Earthquake)	7.3	78.3	Hyogo Prefecture: 2.9% (As of March 31, 1994)
4	April 7, 2011	Miyagi-oki Earthquake	7.2	32.4	Miyagi Prefecture: 33.6% (As of March 31, 2011)
5	March 20, 2005	Western Fukuoka-oki Earthquake	7.0	17.0	Fukuoka Prefecture: 15.5% (As of March 31, 2004)
6	March 24, 2001	Geiyo Earthquake	6.7	16.9	Hiroshima Prefecture: 14.2% (As of March 31, 2000)
7	October 23, 2004	Niigata Chuetsu Earthquake	6.8	14.9	Niigata Prefecture: 11.2% (As of March 31, 2004)
8	July 16, 2007	Niigata Chuetsu-oki Earthquake	6.8	8.2	Niigata Prefecture: 13.7% (As of March 31, 2007)
9	April 20, 2005	Western Fukuoka-oki Earthquake	5.8	6.4	Fukuoka Prefecture: 16.6% (As of March 31, 2005)
10	September 26, 2003	Tokachi-oki Earthquake	8.0	6.0	Hokkaido Prefecture: 15.5% (As of March 31, 2003)

Note: The total claims paid for The Great East Japan Earthquake is the total amount of claims paid for earthquakes centered in the following areas; (1) off the Pacific coast of Tohoku, (2) Miyagi-ken-oki, (3) Shizuoka-ken Tobu, and (4) Fukushima-ken Hamadori, at 1,311.3 billion yen.

Sources: 1. *Fact Book 2016-2017, General Insurance in Japan* (The General Insurance Association of Japan)
2. Japan Earthquake Reinsurance Co., Ltd. (as of March 31, 2017)

Table 2: 10 Largest Claims Paid for Windstorm and Flood

	Name of Disaster	Place	Date	Claims Paid (Billions of yen)			
				Fire and Miscellaneous	Automobile	Marine	Total
1	Typhoon No. 19 (Typhoon Mireille)	Nationwide	Sep. 26-28, 1991	522.5	26.9	18.5	568.0
2	Typhoon No. 18 (Typhoon Songda)	Nationwide	Sep. 4-8, 2004	356.4	25.9	5.1	387.4
3	2014 Snowfall	Kanto	Feb. 2014	298.4	24.1	—	322.4
4	Typhoon No. 18 (Typhoon Bart)	Kumamoto, Yamaguchi, Fukuoka, etc.	Sep. 21-25, 1999	284.7	21.2	8.8	314.7
5	Typhoon No. 15 (Typhoon Goni)	Nationwide	Aug. 24-26, 2015	156.1	8.1	—	164.2
6	Typhoon No. 7 (Typhoon Vicki)	Kinki	Sep. 22, 1998	151.4	6.1	2.4	159.9
7	Typhoon No. 23 (Typhoon Tokage)	Western part of the nation	Oct. 20, 2004	111.2	17.9	8.9	138.0
8	Typhoon No. 13 (Typhoon Shanshan)	Fukuoka, Saga, Nagasaki, Miyazaki, etc.	Sep. 15-20, 2006	116.1	14.7	1.2	132.0
9	Typhoon No. 16 (Typhoon Chaba)	Nationwide	Aug. 30-31, 2004	103.8	13.8	3.5	121.0
10	Typhoon No. 15 (Typhoon Roke)	Shizuoka, Kanagawa, etc.	Sep. 15-22, 2011	100.4	10.0	1.9	112.3

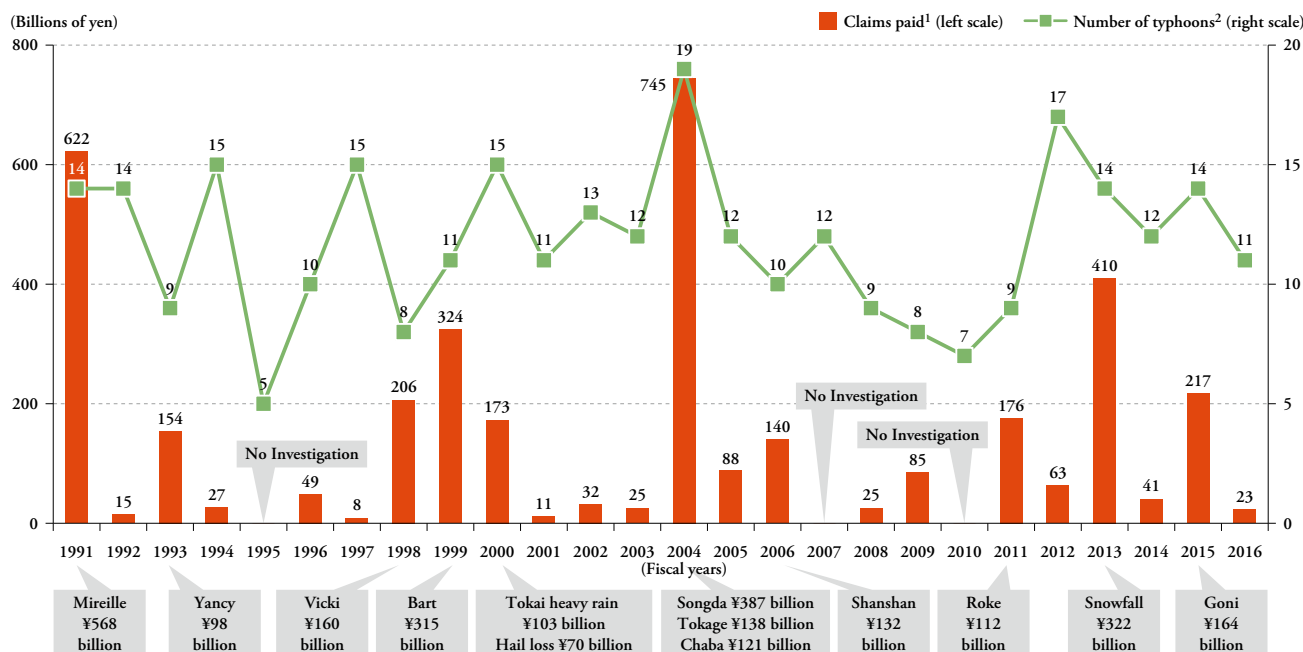
Note: Figures are for GIAJ member direct insurers, and do not include foreign insurers or others.

Source: *Fact Book 2016-2017, General Insurance in Japan* (The General Insurance Association of Japan)

Each of the top ten claims for windstorm and flood damage exceeded 100 billion yen. On the other hand, each of the claims paid for earthquake damage are comparatively small except for the Great East Japan Earthquake and the Kumamoto Earthquake.
→ In the case of non-life insurance companies, risk related to windstorm and flooding is greater than for earthquakes.



Figure 3: Claims Paid for Windstorm and Flood Damage in Japan



Notes: 1. Data by GIAJ

2. Data by Japan Meteorological Agency

Source: *FACT BOOK 2017* (Japanese Version) (The General Insurance Association of Japan)

Associated with these earthquakes, claims paid by non-life insurance companies totaled 1,274.9 billion yen for the Great East Japan Earthquake; 375.3 billion yen for the Kumamoto Earthquake in 2016 that directly caused about 50 deaths; and in third place, 78.3 billion yen for the Great Hanshin-Awaji Earthquake. According to historical statistics up to 2017, the amount paid for the 2003 Tokachi-Oki Earthquake (with one person dead and another missing) is in 10th place with claims paid of only 6.0 billion yen.

In comparison, claims paid for windstorm and flood damage totaled as much as 568.0 billion yen for Typhoon No. 19 in 1991 (Typhoon Mireille); 387.4 billion yen for Typhoon No. 18 in 2004 (Typhoon Songda); 322.4 billion yen for snow damage in 2014; 314.7 billion yen for Typhoon No. 18 in 1999 (Typhoon Bart); and in 10th place historically, 112.3 billion yen for Typhoon No. 15 in 2011 (Typhoon Roke).

The point is, in terms of claims paid, the damage caused by earthquakes can certainly be serious but it is less common, while windstorm and flood damage is oppressively frequent and claims paid can be quite high. Overall, therefore, windstorm and flood damage is quite serious in Japan.

Moreover, these issues transcend the borders of Japan. The globalization of the economy means that natural disasters overseas also have serious impacts on Japan's livelihood and economy. Consider also that windstorm and flooding caused roughly 60% of worldwide human and economic loss from all major natural disasters from 1980 to 2012.

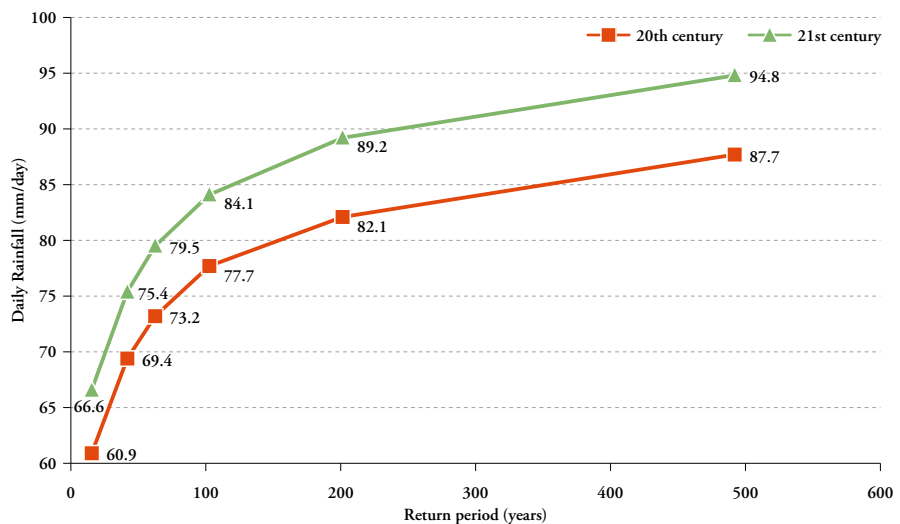
The damage caused by flooding in Thailand in 2011 is symbolic. It affected supply chains in global manufacturing industries including hard drives and automotive components, and Japanese non-life insurance companies paid 900.0 billion yen in claims by Japanese-affiliated companies for flood and related damages. This was significantly higher than the 600.0 billion yen in claims paid to the corporate sector for earthquake-related losses in the Great East Japan Earthquake. One result of globalization is that natural disasters in other countries are not just other people's problems.

In the case of the floods in Thailand, opportunity loss caused by the need to stop operations was greater than losses from direct property damage (including loss of assets). The two-day shut down of the New York Stock Exchange because of Hurricane Sandy in 2012 had a similar impact. These opportunity losses are another necessary perspective on windstorm and flood damage.

4. The Future of Water Risk in Japan

It is estimated that flood damage due to inundation in Japan circa 2050 will be in the vicinity of 4.4 trillion yen to 4.9 trillion yen annually and slope failure damage due to landslides will be between 490 billion yen and 580 billion yen (Kazama et al., 2009). This may seem excessive compared with the current annual average of about 300.0 billion yen for flood and landslide damages. Estimates of inland flood damage only (Fukubayashi, 2012) indicate that historical inland flood damage of about 120.0 billion annually could rise to between 140.0 billion yen and 680.0 billion yen annually at the end of this century given no change in asset density or vulnerability. The reason for the wide variance in estimates is that those estimates are based on climate models that are highly dependent on calculations of heavy rain in certain geographic locations in Japan, which may or may not occur. Therefore, differences in rain intensity and the geographic location of incidental heavy rain will be more significant than differences in the volume of greenhouse gas emissions by humans in the years ahead.

Figure 4: Changes in Probable Precipitation



Note: Changes in precipitation rate (ordinate axis) corresponding to return period (abscissa axis) during the 20th century (orange line) and the 21st century (green line) estimated by fitting probability distribution functions for annual maximum daily rainfall near Tokyo simulated based on a general circulation model.



Also, as with previous observations of the relationship between the daily mean temperature and the rainfall intensity, the maximum value of the water vapor content in the atmosphere is predicted to increase with global warming, and the intensity of heavy rain over a short time period is predicted to increase accordingly. In other words, torrential rain is likely to occur more frequently. As schematically illustrated in Figure 4, the 21st century estimate of daily precipitation with 100 year return period (1% probability to occur) of 84.1 mm is only about 10% more than the 20th century estimate of 77.7 mm, but 84.1 mm corresponds to the heavy rain of 300 year return period. The change in intensity may seem small at first glance, but the interpretation of extreme phenomena requires careful attention at the point: the changes in frequency may be very significant.

WGI AR5 states about tropical cyclones that maximum wind speed and precipitation intensity are likely to increase, although the likelihood is high that the frequency of tropical cyclones such as typhoons will decrease or remain the same. According to estimates of the high-resolution atmospheric general circulation model of the Meteorological Research Institute of the Japan Meteorological Agency (Murakami et al., 2012), the maximum typhoon wind speed near the ground will increase by 10% to 20%. Today, earthquake motion should be the standard for assumed design stress for virtually all buildings. However, a 20% increase in wind speed corresponds to a 40% increase in wind stress, so a fundamental review of structural design in consideration of strong winds from typhoons may be necessary.

Regarding the rainy season, WGI AR5 indicates that precipitation will increase and the monsoon cycle will intensify for the summer monsoon in East Asia, and that the extreme value of precipitation is highly likely to increase. In addition, the monsoon will begin a little earlier or at about the same time, but its end will likely be delayed, resulting in a longer monsoon period. However, the confidence level of whether fluctuation in rainfall during the monsoon season will increase in the future is only moderate, because agreement between models is poor. As a result, how it might affect water resource management is still uncertain. The need to prepare for further torrential rain at the end of the rainy season has a higher degree of certainty.

WGI AR5's description of tornado and thunderstorm changes is limited. Using results estimated for the mainland United States from changes in the wide area environment related to tornadoes and thunderstorm intensity, such as convective available potential energy (CAPE) and wind direction change over the entire troposphere (shear), WGI AR5 predicts that thunderstorms may gain in intensity if they occur throughout the United States east of the Rockies.

In Japan, from the relationship between the temperature and the amount of water vapor in the atmosphere (Utsumi et al., 2011), as discussed above, a simplistic assumption might be that the intensity of rainfall over short periods will increase as temperatures rise in tandem with climate change and that thunderstorms will also increase in intensity; but a report (Yoshida, 2002) that the number of days with lightning in summer decreased in the 20th century in Kita Kanto seems to contradict this, so it may not be so straightforward.

5. Conclusion

While climate change is now progressing, serious changes are still several decades away. Even without significant climate changes, we have been suffering serious damages from windstorm and flooding. A key reason for the seeming increased intensity of natural disasters in recent years is that people are exhibiting an appetite for risk in how they react and where they live. This is mainly because the population continues to increase and concentrates in cities while assets expand, and because disaster prevention systems are not well-prepared yet.

Humans may be able to avoid serious damage by minimizing the emission of greenhouse gases (mitigation) and increasing disaster preparedness (adaptation) as climate change progresses. However, many countries are faced with aging societies (Japan leads the world in this respect) and fiscal constraints tighten year by year, making it almost impossible to develop new infrastructure that can sufficiently protect against windstorm and flood damage, allowing people to live safely.

The Great East Japan Earthquake of March 2011 led Japan to introduce a new concept differentiating two different levels of tsunami to prepare countermeasures – one is infrastructure to protect against tsunami that occur with return period of 100 year or less (L1), and another is for early warning information systems and the evacuation of residents for tsunami that occur with return period such as 1,000 years (L2). For floods, Japan has long guided infrastructure development and land use implicitly and explicitly, considering worst-case flood countermeasures that exceed design flood.

However, Japan's recent financial situation poses difficulties for completing the development of flood control infrastructure in the near future, to deal with a flood with return period of 100-200 years. Furthermore, it is concerned that actual safety levels will decrease further due to climate change. As a result, it may be inevitable for flood safety levels in Japan to fall further.

Fortunately, however, people will have less need to live in areas prone to windstorm and flood damage, and other natural disasters in general, if the population will continue to decrease. We cannot leave this issue to be guided by market principles only – the government needs long-term vision in developing policies that build Japan and guide it in addressing issues including habitation in safe areas, together with the realization of energy conservation and comfortable lifestyles, and the formation of appropriate communities.



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The Evolution of Catastrophe Reinsurance Buying Practices at Japanese Non-Life Insurers in the Decade to 2018

3.

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Ten years ago reinsurance buyers for Japanese insurers were facing a similar set of problems to those faced by their counterparts in the rest of the world. The financial crisis of 2008 had left the reinsurance industry pondering the assets held on its balance sheet, but at the same time satisfied to find that it had not suffered any of the catastrophic company failures experienced elsewhere in the financial sector. Nevertheless there was fall out from the crisis, and the increased cost of capital that resulted meant that reinsurance rates rose for most buyers in most classes. The decade since has seen further changes, and in this article we track how they have impacted the Japanese reinsurance market and how it has evolved as a result. Firstly, we will consider the wider macro-economic environment and its effect on the Japanese reinsurance market, and secondly, we will review how reinsurance purchasing has evolved over the past decade. Finally, we will draw some simple conclusions and propose some thoughts for the future.

1. Impact of Events in the Macro-Economic and Insurance Environments

The global reinsurance market has evolved over the past ten years; and whilst change is in some sense continuous, identification of the key moments can aid understanding of the process. The table below gives a simple overview starting with the financial crisis and ending today.

Period	Key Factors	Market Features
2008	Financial Crisis	Increased focus on capital preservation Consolidation of Japanese non-life insurance industry Japanese insurers look to overseas expansion
2011	Great East Japan Earthquake, Thai Floods; New Zealand EQ; Chilean EQ	The Great East Japan Earthquake and Thai floods had a significant impact on the Japanese reinsurance market. However, the impact of each natural catastrophe loss in 2011 was limited to the local market.
2017	HIM Losses	Soft market run halted, with price increases seen at least in the immediate aftermath. But capital remains abundant.

The macro-economic environment has a large impact on any regional market, including Japan. The financial crisis and subsequent decline in global stock markets drove the Japanese insurance market to capitalize on the benefits of consolidation in order to improve returns. This process involved the end of the six company structure in the non-life industry and the emergence of the so called “Big 3” groups. At the same time, slow or no growth in domestic markets led Japanese insurance groups to shift their growth focus to overseas expansion, a focus which continues to the present day.

The Great East Japan Earthquake of March 11, 2011 and subsequent tsunami caused a humanitarian disaster and widespread damage. It currently ranks as the most expensive in history for insured losses outside of the United States. This loss had a deep impact on the insurance and reinsurance industries and will be looked at in more detail later in this article. Japanese insurers were also significantly and possibly unexpectedly affected by the Thai floods later in the same year. 2017 was an extremely



active natural cat year for the insurance industry, with Swiss Re estimating it to be the worst year on record in terms of insured loss.¹ Losses due to HIM had a direct impact on Japanese insurance groups in a way that would not have been the case in previous years because of their increased ownership of (re)insurer subsidiaries operating in global (re)insurance markets. However, at the local domestic level the effect on the reinsurance market was limited to an ending of the soft market that had been enjoyed by buyers in the immediately preceding years.

It appears that global economic growth has stabilized at a high but more volatile level. Interest as well as inflation rates continue to pick up in major economies and whilst the growth backdrop remains favourable on the whole, political risks are likely to remain a concern for businesses and investors going forward. Despite these facts and the losses described above, reinsurance capacity has remained abundant and the predicted hard market has failed to materialise.

1. Source: Swiss Re Sigma No 1/2018

2. The Evolution of Japanese Reinsurance Buying

So much for the context. What are the main themes of the past ten years and how have they been influenced by the factors referred to above? We identified for study five of the key themes of the past ten years, as listed in the table below.

Theme
1. Amount of catastrophe limit purchased
2. Evolution of cat purchases
3. Reinsurance rating levels
4. “Alternative” forms of capital
5. Globalisation of Japanese insurance groups

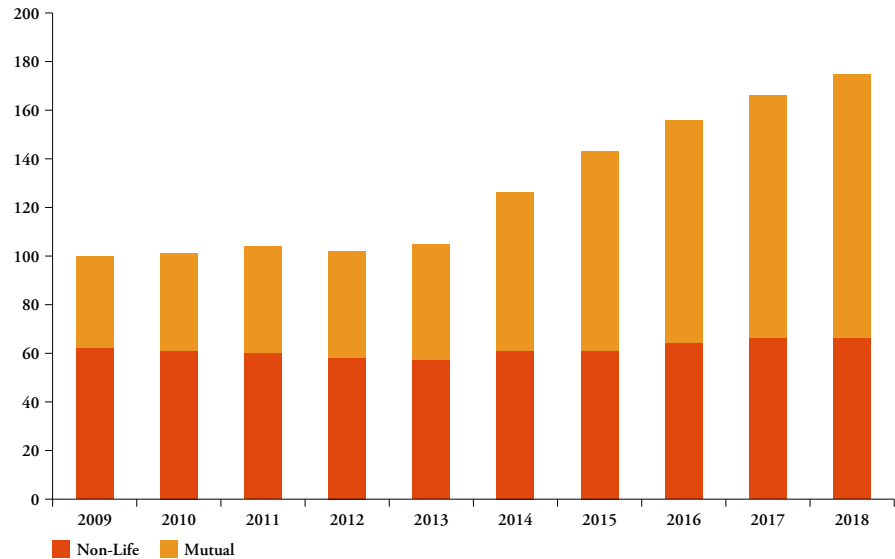
(1) Amount of Catastrophe Limit Purchased Has Grown

According to a survey conducted by the World Economic Forum in 2017, the risk that is most concerning to businesses in Japan is natural catastrophe, followed closely by cyber attack risk and fiscal crisis.² Over the past ten years, both the Great East Japan Earthquake and to a lesser extent the 2016 Kumamoto Earthquake have served as a reminder of Japan’s high exposure to natural catastrophe, leading to sustained demand for earthquake insurance. This demand has in itself translated into an increased requirement for earthquake reinsurance capacity, but at the same time the traditionally cautious approach taken by Japanese companies has meant that growth in the insurance market has been tightly controlled, meaning the reinsurance limit for non-life stock companies has grown at only a modest rate. At the same time, there has been significant growth in the earthquake reinsurance capacity purchased by the mutual (cooperative insurance) sector, reflecting how attitudes to the original risk have changed since the 2011 Great East Japan Earthquake. In an interesting parallel, the size of the national earthquake scheme has also grown significantly over the same period.

2. Source: World Economic Forum

3. The Evolution of Catastrophe Reinsurance Buying Practices at Japanese Non-Life Insurers in the Decade to 2018

Figure 1: Earthquake Treaty Reinsurance Capacity Purchased by Japanese Insurers 2009-2018 (Index)

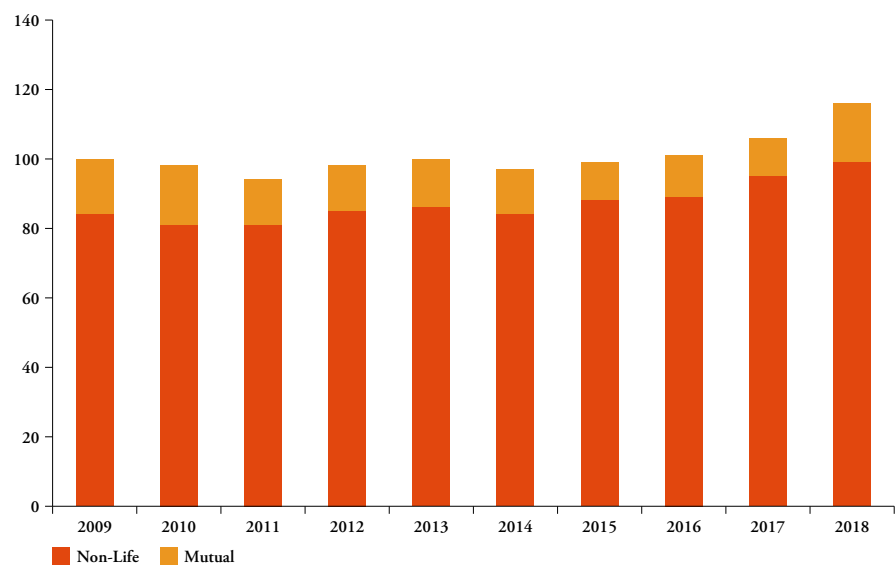


Note: Capacity purchased in 2009 is used as Index 100.

Source: Guy Carpenter

In contrast, large Japanese non-life stock company insurers have continued to modestly increase their protection against typhoon risk, based on more accurate modelling and an ongoing desire to buy capacity to levels consistent against benchmarks used by international peers.

Figure 2: Typhoon Treaty Reinsurance Capacity Purchased by Japanese Insurers 2009-2018 (Index)



Note: Capacity purchased in 2009 is used as Index 100.

Source: Guy Carpenter

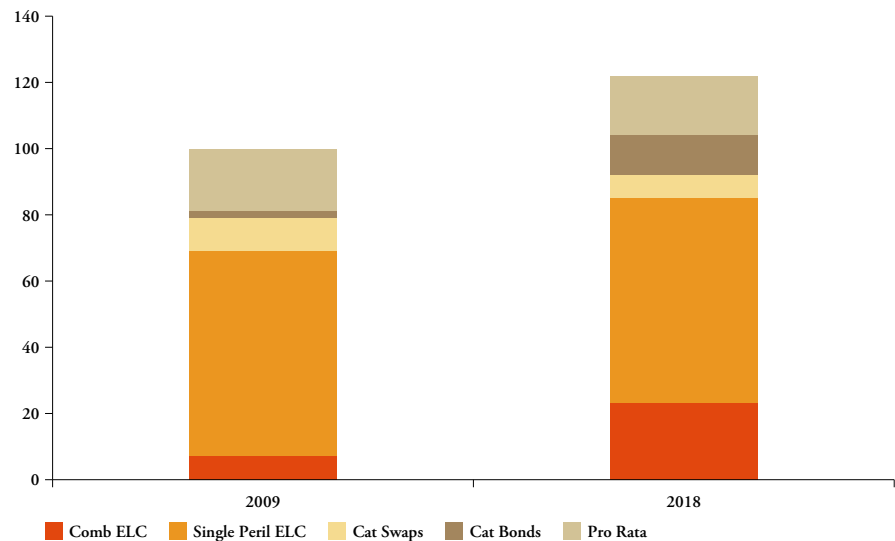


In both the earthquake and typhoon cases, the larger size of the post-consolidation non-life groups has meant that the overall deductible level retained by the market has increased, which has in part dampened any requirement for additional capacity.

(2) Evolution of Cat Purchases Has Rationalised and Diversified

As well as an increasing need for overall capacity, the reinsurance market in Japan has changed in terms of the coverage in the protections it purchases. In 2009, most of the capacity bought was in one of four single named peril forms: EQ pro rata; EQ ELC; EFEI ELC; and Typhoon ELC, and the overwhelming majority of placements were on an annual basis.

Figure 3: Composition of Capacity 2009 vs. 2018 (Index)



Note: Capacity purchased in 2009 is used as Index 100.

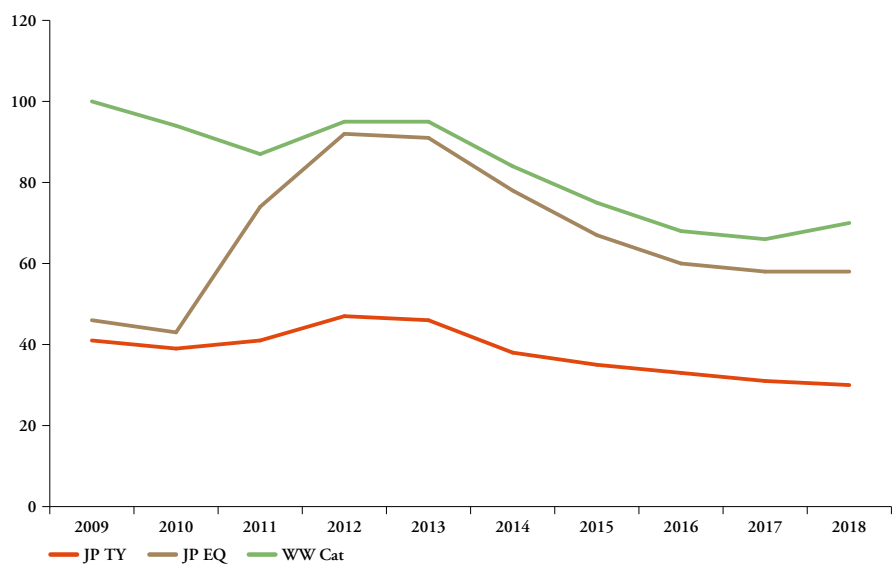
Source: Guy Carpenter

Move forward to 2018, and buyers have tended to combine all perils wherever possible, buying single peril covers where necessary to build up protection against peak exposures once the combined requirement has been filled. At the same time the amount of multi-year protection is now significant, representing well over a quarter of all capacity purchased, a proportion that looks set to grow in the future. The purchase of cat bonds has shown the largest percentage growth over the past decade, albeit from a small start point in 2009.

(3) Reinsurance Rating Levels Follow WW Market Trends Unless There is Good Reason

Pricing in the Japanese cat market has tended to move in line with the international market. In Figure 4 below this phenomenon is seen as the ROL indices move broadly in concert.

Figure 4: Cat Reinsurance Pricing Index 2009-2018

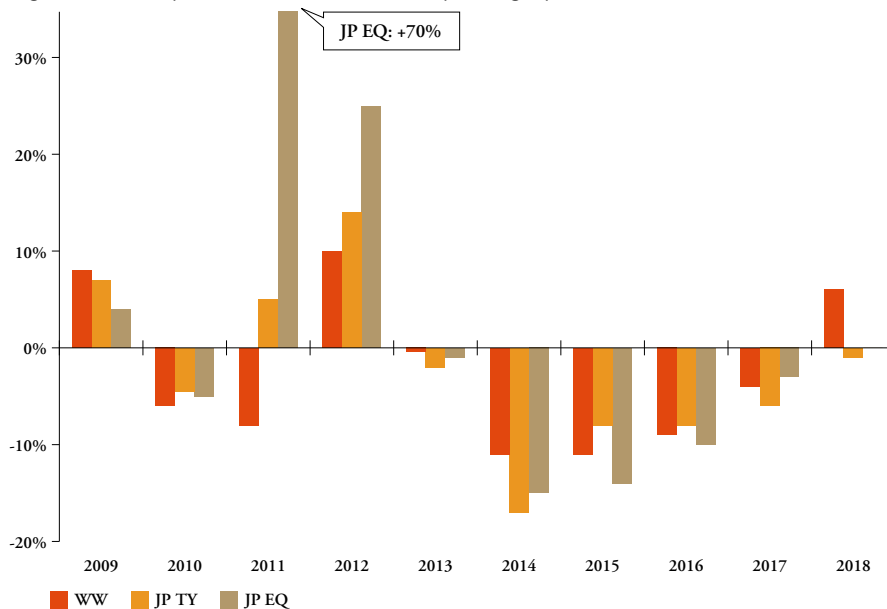


Source: Guy Carpenter

Closer examination of the data shows that, whilst the underlying trend is to move in line with the market, individual factors can have an effect, and may be dominant in the final pricing. Figure 5 below shows pricing for Japanese cat perils at April 1 of each year compared to price movements globally at the immediately preceding January 1 renewal.



Figure 5: Year by Year Price Movements by Category 2009-2018



Source: Guy Carpenter

It can be seen that in the post-Great East Japan Earthquake renewal in 2011, Japanese pricing increased whilst WW Cat ROL decreased somewhat. Clearly the timing of the event (March 11, 2011) had an impact, but the difference in pricing was marked. Conversely, Japanese buyers did not face price rises at the 2018 renewal despite a modest hardening in the global position at January 1.

Pricing for Japanese windstorm remains at or near historic lows, but buyers would be quick to point out the huge positive profit balances built up by reinsurers over the past 20 years. It would appear that reinsurers remain keen to write Japanese catastrophe business and there is a significant oversupply of available capacity.

(4) “Alternative” Forms of Capital Have Started to Grow in Importance

So called alternative capital providers have been slower to enter the Japanese market than the U.S. or retro markets. Nevertheless they now provide a small but significant proportion of the total capacity purchased. Much of this capacity is focused in the cat bond space, as can be seen in Figure 3 above, and has grown substantially in the past 10 years. In fact, at over 400% over 10 years, growth in this area is the largest of all the types of capacity. Penetration of these capital providers into the traditional core cat ELC placements has been slower, as typical ROL levels, which lie in the single digits, have not favoured full collateralisation, whilst at the same time buyers have preferred to continue to purchase the standard reinstatable cover provided by rated carriers.

(5) Globalisation of Japanese Insurance Groups the Approach to Reinsurance is Evolving

Faced with an aging population, decreasing car ownership and limited opportunities for growth in domestic markets, Japanese insurance companies have looked to diversify their businesses through consolidation at home and acquisitions overseas. Operational efficiencies have been pursued in domestic markets, but overseas purchases have been significant and the result is that the big three groups now have a significant proportion of their business sourced from overseas. There are two implications of these changes for the reinsurance market: one is the fact that a more diversified, larger Japanese company should be able to increase its retentions in many areas of the world; and the second is that a global approach to reinsurance may become more desirable. Many of the purchases are relatively recent and the approach to reinsurance is evolving as the new acquisitions are assimilated into the group structure. We may expect to see further changes in this area going forward.

3. A Brief Summary of Past Renewal Seasons in Japan

Examination of the past decade's renewal seasons shows the above trends developing. **2009:** Buyers' capacity demands were met despite reductions in capacity arising from the wider global economic environment, although there was no real overplacement. Movements in exchange rates also restricted some reinsurers' capacity, particularly those using British pounds as their base currency. Reinsurer pressure for significant rate increases was dampened by a good year of results from most treaties in all lines. Purchase of windstorm capacity increased, although buyers found that it was necessary to pay relatively enhanced prices to attract this new support, reflecting tighter capacity constraints. This renewal also saw a move towards combining windstorm and earthquake perils.

2010: A smooth renewal, perhaps easier than previous years, reflecting a generally softer market. The perception that macro-economic conditions had improved following the financial crisis meant that some buyers were able to reduce their overall windstorm limit requirement. This smaller demand combined with a generally softening global reinsurance market to reduce prices. Placements remained tight, driven mainly by several mergers amongst reinsurers which served to reduce the overall capacity available. Total EFEI ELC placed on a standalone basis continued to shrink.

2011: The renewal was proceeding smoothly until the March 11 earthquake. However, following the event the reinsurance market generally responded in a rational manner and buyers were able to renew unchanged capacity for earthquake pro rata treaties. The picture for ELC buyers was mixed and depended on individual circumstances. Many of the larger programmes, and particularly the large mutuals, opted to extend their programmes for up to 3 months through to July 1. Those that did renew at April 1 saw rate increases of between 15 percent and 50 percent. Windstorm pricing was also affected by the earthquake with rates increasing between 3 percent and 10 percent. Capacity for this latter line of business remained tight.

2012: This was a complex renewal season for Japanese cedants, impacted by flood losses in Thailand, the continued aftermath of the March 2011 Great East Japan



Earthquake as well as a hardening trend in the wider reinsurance market. Rates increased in all property catastrophe and per risk lines. Casualty lines were mixed, but the general trend was for modest increases. Price increases on earthquake excess of loss treaties were significant for the second year in a row with increases of 10 to 40 percent on top of increases seen in 2011, resulting in pricing that was all but double that of pre-Great East Japan Earthquake levels. Loss free windstorm excess of loss was impacted by the adverse market conditions, and prices rose. Capacity was still tight but there was some additional capacity drawn in as a result of the increase in price. Such additional capacity was offset by reinsurers impacted by adverse foreign exchange movements, retro constrictions and internal aggregate controls. Thai flood losses affected the property per risk renewal more than the cat.

2013: No major catastrophes and an increased reinsurer appetite in most lines led to a calmer renewal than in the two previous years. Prices were flat or down a little. Excess capacity returned to the market for the first time in several years driven by the weakening of the Japanese yen against major currencies, reinsurers' desire for growth and increased interest in the Japanese market from alternative forms of reinsurance capital. Earthquake pro rata treaties continued to benefit from increases to original pricing. Earthquake excess of loss pricing decreased a little for the first time since the Great East Japan Earthquake event. The mutual sector purchased increased earthquake capacity whilst the non-life companies reduced their overall purchase slightly. Available capacity increased and was able to fill the increase in demand. Windstorm pricing decreased a little and the total capacity purchased increased modestly. Buyers started to consider alternative structures such as aggregate ELC.

2014: The soft market returned with greater price reductions achieved than expected. Competition for market share from reinsurers drove large over placement on many covers. Company mergers, corporate restructuring, improved cedant balance sheets and combination of perils in cat covers served to reinforce the perception that demand was decreasing. There was a general broadening of terms and conditions with a move by some to a more standard "All Risks" wording, extension of hours clauses and adoption of "sole judge" language. In view of the massive oversupply of capacity, some cedants took the opportunity to realign their reinsurer panel.

2015: Soft market conditions continued with buyers achieving reasonable risk adjusted and actual price reductions in most main lines of business. Some buyers took advantage of the favourable market conditions to expand capacity purchased, both through new layers and reduced co-reinsurance percentages. Losses from the snowstorms of February 2014 exerted some influence on pricing at the lower end of cat programmes but this was balanced by risk adjusted reductions on non-snowstorm affected layers in the middle to upper regions.

2016: Ongoing soft market conditions meant another smooth renewal for Japanese buyers. Pricing continued to decrease in nearly all lines of business and capacity oversupply remained, though there was evidence that this was less than in previous years. Certain cedants sought increased capacity, which was secured without problem.

As well as risk adjusted savings, there were actual cost savings available for some layers, reducing the average cost per unit of capacity purchased. Some windstorm layers were transacted at a price below 2% rate on line, the first time that such pricing had been achieved in recent years. The large groups now all place a core programme centred on a combined perils structure. Moreover, the amount of capacity placed via aggregate excess of loss, cat bonds and multi-year placements all increased. In 2016, we also saw Japanese buyers taking the first steps to combine domestic exposures into cat protections covering territories elsewhere in the world.

2017: The soft market prevailed and buyers duly secured risk adjusted rate reductions in most property lines of business. There was some evidence that the degree of overall reduction for property lines was less compared to previous renewals. Reinsurer capacity once again remained high and in fact appeared to increase despite falling rates. Buyers continued to purchase additional cat limit, secured with few problems.

2018: Despite predictions that international catastrophe excess of loss rates were set to move upwards as a result of the active 2017 Atlantic hurricane season, prices in Japan were near flat on a risk adjusted basis. Reinsurer capacity once again remained more than sufficient to secure placements, with no sign of any market withdrawals. Capacity increased in light of flat rates, even though prices remain at relatively low levels from a historical perspective.

4. Summary

The global (re)insurance market and the Japanese domestic market have been through a period of change over the past decade. The Japanese market has survived the global financial crisis, the number of Japanese non-life groups has decreased to just three major players, Japan has experienced the largest insured loss outside of the USA and the wider market experienced significant losses in the 2017 Atlantic hurricane season. Against this backdrop, the purchasing patterns of Japanese cat reinsurance buyers have evolved and appear likely to continue to evolve going forward. Whilst domestic factors will remain important, the wider global market will continue to exert an influence, and this may be in ways not experienced before as well as via the more predictable drivers such as large losses. Future areas of focus may for example be increased trade protectionism and technological advancements. Nevertheless the need for companies to protect themselves against acts of nature appears unlikely to disappear for the foreseeable future and so it can be expected that the cat reinsurance market will endure even as its shape continues to change.

Glossary

In this article, the following abbreviations are used.

EQ: earthquake

HIM: Hurricane Harvey, Irma and Maria

Cat: catastrophe

JER: Japan Earthquake Reinsurance

ELC: excess of loss coverage

EFEI: earthquake fire expenses insurance

Comb: combined

WW: worldwide

ROL: rate on line

TY: typhoon



Trends in Japan's Non-Life Insurance Industry

4.

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

The GDP of Japan ranks third in the world and its economy has continued to grow moderately in recent years. In its economic outlook, the government of Japan estimates that the real GDP growth rate in fiscal 2017 was 1.9%, the rate in fiscal 2018 will be around 1.8%, and the economy will grow gradually in the short term.

At the same time, Japan is faced with a declining birthrate and aging society in the medium term. The median estimate of the National Institute of Population and Social Security Research suggests the population will drop by about 30% from its current level to 88.08 million in 2065, which would inhibit economic growth over the medium and long term.

“The Action Plan for the Realization of Work Style Reform” was announced by the council of the Prime Minister’s office in March 2017. Its core framework for addressing the problems related to Japan’s falling birthrate and aging population is correcting long working hours and achieving equal pay for equal work. The objectives of the action plan are to increase the birthrate and to create an environment that helps families raise children by making it easier for young people to balance work and childcare, and to ensure stable employment and improve working conditions through work style reform.

Looking at the Japanese non-life insurance market, automobile insurance currently accounts for about half of net premium income. Its market share is expected to decrease gradually because of an increase in the number of vehicles equipped with safety support functions and the spread of automated driving.

On the other hand, corporations must deal with more diverse and complex risks, creating a growing need for new types of insurance including cyber and directors and officers liability insurance.

While the market is mature, non-life insurers in Japan are creating new markets by identifying the latest customer needs and providing new products and services to meet those needs. They are also innovating to raise operating efficiency and speed. Furthermore, the top three insurance groups are expanding overseas business to achieve sustainable growth.

2. Overview of the Non-Life Insurance Industry

(1) Status of Non-Life Insurance Companies

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 20 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 Holdings, Inc. and Tokio Marine Holdings, Inc.) account for more than 85% of net premium income written by the 26 GIAJ members as a whole.

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 underwriting expense ratio (other than commission and brokerage) in fiscal 2017 decreased to 15%, compared with 21% for all non-life companies in the industry for fiscal 1995, prior to liberalization.

Recent trends among the 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 Sampo Holdings, Sampo Japan Insurance Inc. and NIPPONKOA Insurance Co., Ltd., were merged into Sampo Japan Nipponkoa Insurance Inc. in September 2014.

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

In January 2018, AIG Japan Holdings merged its wholly owned subsidiaries, AIU Insurance Company, Ltd. and The Fuji Fire and Marine Insurance Company, Ltd., to create a new company, AIG General Insurance Co., Ltd.

In addition to the above, Rakuten, Inc. made Asahi Fire & Marine Insurance Co., Ltd. a wholly owned subsidiary in April 2018, and changed the company name to Rakuten General Insurance Co., Ltd. in July 2018. Rakuten has a wide variety of Internet businesses and focuses on e-commerce. Rakuten and Rakuten General Insurance are targeting growth largely by enhancing their lineup of insurance products that are compatible with Internet services and partnering with other companies in alliances.

(2) Trends in Business Results of Non-Life Insurance Companies for Fiscal 2017

Fiscal 2017 results for Japan's non-life insurance companies were solid. An overview of the results of the 26 non-life insurers that are members of the General Insurance Association of Japan (GIAJ) is as follows:

Net premium income in all lines of business increased 71.9 billion yen from the previous fiscal year to 8,380.6 billion yen, primarily driven by fire and automobile insurance.

Net claims paid (paid basis) decreased by 90.1 billion yen to 4,702.3 billion yen. This was due to the huge payments related to the Kumamoto Earthquake in fiscal 2016. As a result, the loss ratio for fiscal 2017 improved by 1.8 percentage points to 61.5%.

Expenses increased by 52.5 billion yen to 2,735.1 billion yen. The net expense ratio increased 0.3 percentage points to 32.6%.

Underwriting profit (earned/incurred basis) decreased by 60.3 billion yen to 279.8 billion yen due to the impact of typhoons and other natural disasters in Japan. Ordinary profits, calculated as the sum of underwriting profit and investment profit, decreased 31.2 billion yen to 812.2 billion yen. After deducting tax expense, net income increased 63.9 billion yen to 678.3 billion yen because of adjustment of the corporate tax and other factors.

3. Recent Non-Life Insurance Industry Trends

The net premium income of the top three non-life insurance groups, including domestic non-life insurance subsidiaries and overseas subsidiaries, increased overall due largely to core domestic companies. On the other hand, ordinary profits were largely impacted by massive natural disasters including hurricanes Harvey, Irma and Maria in the United States from August to September 2017.

(1) New Product Development

(a) Automobile Insurance

In recent years, energetic initiatives have brought together industry, government and academia to make vehicles with automated driving technology a practical reality. They are making progress in creating an automated driving system that will enable the development of vehicles with practical automated driving technology, the establishment of a reliable framework for quickly assisting victims of accidents involving automated driving, and clarification of responsibility when accidents occur.

Given these circumstances, as one response to the changing automobile insurance market, non-life insurance companies are preparing products to insure the risks associated with automated driving technology up to driver intervention at level three autonomy (conditionally automated driving). For example, they are providing insurance for automated driving technology verification and endorsements for accident victims of automated driving in cases where the driver responsibility of the automated vehicle cannot be verified immediately.

The objective of non-life insurance companies is to make sure that society is secure and safe through initiatives such as developing products that support the advance and popularization of automated driving technology. Initiatives include participating in automated driving technology verification tests at level four autonomy (highly automated driving) and above to enhance the development of optimal automated driving insurance products for this level of technology.

(b) Cyber Insurance

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

In response, Japan's major non-life insurance companies have become core providers of cyber insurance while also expanding support services for potential clients including consultation for cyber security, such as information diagnostic services and drills against targeted e-mail cyberattacks.

Non-life insurance companies are enhancing coverage to cope with the cyber risks that are becoming increasingly complex.

(c) Sharing Economy

The sharing economy is expanding rapidly in the United States and Europe, and is expected to expand in Japan as well.

In particular, the influx of foreign tourists to Japan for the 2020 Tokyo Olympics

and Paralympics is expected to overwhelm the ability of the existing infrastructure to supply lodging, transportation and other services. It is expected that companies that provide sharing economy services may assist in solving problems.

Japan's non-life insurance companies are collaborating with relevant organizations to help sharing industries grow soundly while focusing on the development and sale of insurance for the sharing economy, as an emerging business opportunity.

For example, non-life insurance companies are selling products that indemnify both the individuals providing services and Sharing Economy Association Japan member companies that are operating service platforms for childcare, housekeeping and other shared skills and services. These products indemnify the parties against legal liability assumed during the provision of services.

It is expected that the non-life insurance industry will cope appropriately with the new risks in the sharing economy as it expands further.

(2) Innovation

The term “fintech,” which has recently come into common use, is also used in the insurance industry. The insurance industry has also embraced the term “insurtech” to refer to the fusion of insurance and information technology for the development of the insurance products mentioned earlier and to encourage innovation in the operations of non-life insurance companies.

Non-life insurance companies collect big data for use in marketing and pricing. They are also accelerating their operations by using AI to assess claims payment and for customer service functions such as call centers. Moreover, AI is expected to carry out primary judgment in the region of insurance sales, underwriting, and payment of claims in the future.

In fiscal 2017, some non-life insurance companies applied blockchain (distributed ledger) technology to insurance policies. Many non-life insurance companies also got together in a consortium to apply blockchain technology to trade operations, and each company conducted demonstration tests. The actual application of blockchain technology to insurance policies should accelerate procedures, contributing significantly to growth in sales of insurance policies and international trade by enhancing security and through the provision of related information.

(3) Expansion of Overseas Business

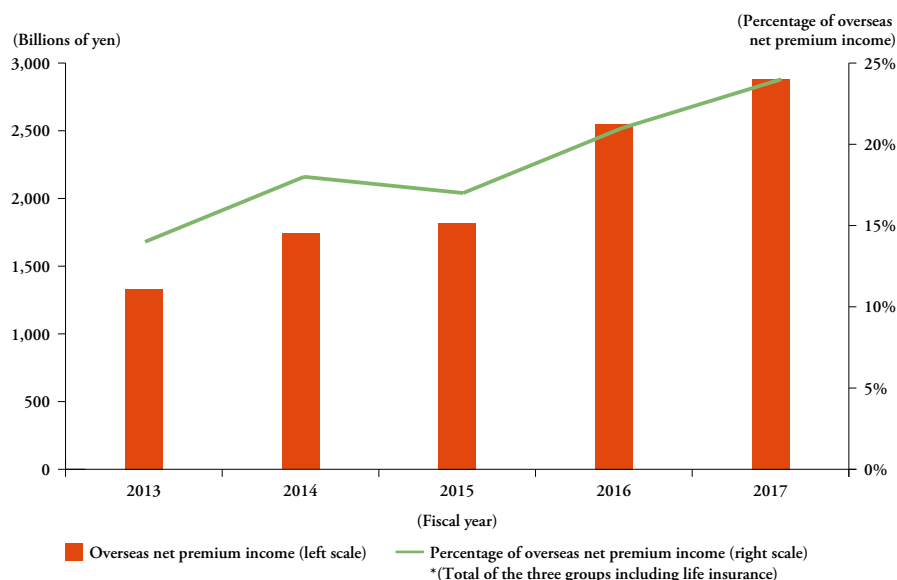
The top three non-life insurance groups have all positioned overseas business as a growth driver, and have aggressively implemented initiatives such as forming business alliances with local insurance companies and engaging in M&A.

Figure 1 shows overseas net premium income* for the top three non-life insurance groups. Over the past several years, overseas net premium income for these insurance groups has been trending upward, and in fiscal 2017 was about two times that of fiscal 2013. As a result, overseas business accounted for approximately 25% of net premium income for the top three non-life insurance groups.

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



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



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

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

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

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

Tokio Marine Holdings has developed its overseas operations particularly in Europe and the United States. It acquired U.K. company Kiln Ltd. and U.S. company Philadelphia Consolidated Holding Corp. in 2008, then acquired U.S. company Delphi Financial Group, Inc. in 2012. Moreover, in October 2015 it acquired U.S. specialty insurer HCC Insurance Holdings, Inc. to further grow its overseas insurance business through diversification and to improve capital efficiency.

Table 1: Overseas Business Development among Japan's Top Three Non-Life Insurance Groups (2017-2018)

Month/Year	Name of Company	Contents
March 2017	Sompo Japan Nipponkoa Insurance	Completed acquisition of Endurance Specialty Holdings
June 2017	Tokio Marine Asia	Increased shareholdings in Indian non-life insurer IFFCO-Tokio General Insurance
August 2017	MS&AD Insurance Group Holdings	Capital participation in Australian financial group Challenger Limited
December 2017	Mitsui Sumitomo Insurance	Completed the acquisition of Singaporean commercial property and casualty insurer First Capital Insurance Limited
January 2018	MS&AD Insurance Group Holdings	Completed acquisition of outstanding shares of English closed book life consolidator ReAssure and issued a third-party allotment of new shares
March 2018	Sompo Holdings	Completed sale of Canopius AG shares
May 2018	Mitsui Sumitomo Insurance	Signed an agreement to acquire shares of Chinese life insurance company BoCommLife Insurance
June 2018	Tokio Marine & Nichido	Acquired Thailand and Indonesia insurance businesses of Insurance Australia Group Limited

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

(4) Trends in Regulation by Regulatory Agencies

A major Financial Services Agency (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. The third field test was conducted in fiscal 2016 and its results were announced in March 2017. The FSA mentions that introducing the economic solvency ratio into the regulatory regime may bring unexpected consequences, such as excessively risk-averse behavior among insurance companies. Therefore, it is preparing for the introduction of the economic solvency ratio by considering unintended consequences and international trends, and by continuing its examination with emphasis on dialogue with relevant parties.

At present, the FSA has broadened its view of financial administration from “*the Form*” to “*the Substance*,” from “*the Past*” to “*the Future*,” and from “*Element by element analysis*” to “*Holistic analysis*.” The FSA is considering a major review and improvement of its stance with the objective of implementing new inspection and supervision that further contribute to achieving the ultimate goals of financial administration. Items for review and improvement cover a wide range of regulations, such as governance of the FSA, quality control, and inspection manuals, as well as organization, human resources, and information infrastructure. The FSA is proceeding methodically and systematically to enable specific improvements that are mutual and consistent.

4. Conclusion

Japan's non-life insurance market will mature further due to the declining birthrate and aging population. Non-life insurance companies will deliver new products and services by developing new technologies, and will discover new customer needs as a result of technological advances. They will also innovate to increase operating efficiency and further expand business overseas with the goal of sustainable growth.



Trends in Japan's Life Insurance Industry

5

Life Underwriting & Planning Department

The Toa Reinsurance Company, Limited

1. Overview of Economic and Social Trends

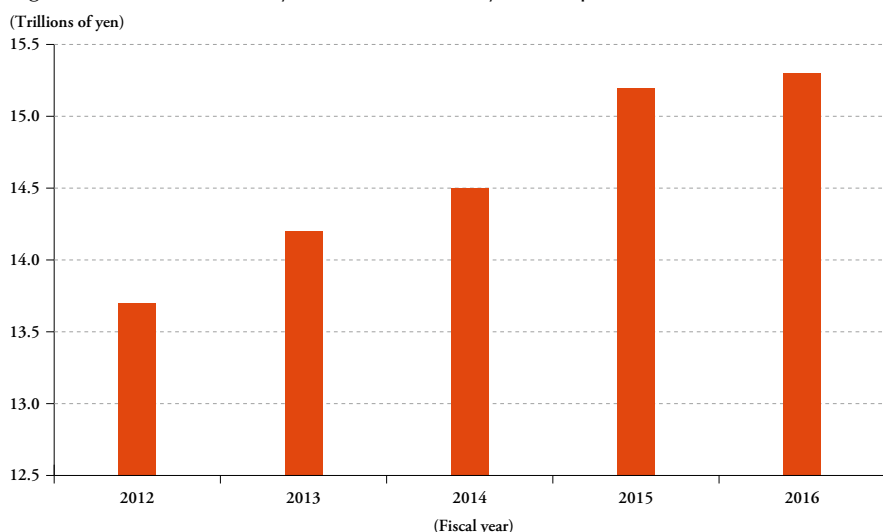
The Influence of the Declining Birthrate and Aging Population on the Public Healthcare Insurance System and Insurance Products

People are living longer in Japan and the birthrate has not increased, so the number of births continues to decline and the population continues to age. Under these circumstances, the financial condition of the public healthcare insurance system continues to deteriorate, so the government is now reviewing the system to better match revenues and expenditures.

All Japanese citizens are required to be enrolled in the public healthcare insurance system. The system consists of (1) the employee health insurance system that covers company employees and their dependents, (2) the advanced elderly medical service system that covers people who are 75 and older, and (3) the national health insurance system that is available to Japanese citizens other than people covered by (1) and (2) above. Under the social security system, 50% of health care expenditures are covered through insurance premiums, 40% through public funding, and 10% through copays from the insured.

Copays for the advanced elderly medical service system are set lower than for the other types of health insurance, and this structure imposes a large burden on public funding and insurance premiums. Healthcare expenses for the advanced elderly people increased at an annual rate of between 1% and 5% for the five years from 2012 through 2016.

Figure 1: Advanced Elderly Medical Service System Expenditures



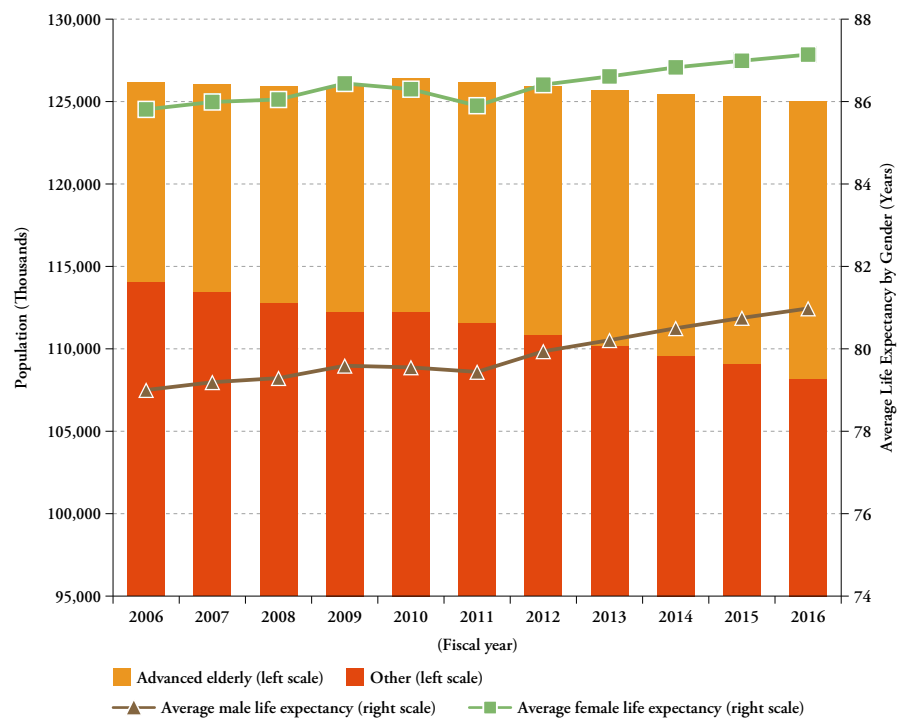
Source: Ministry of Health, Labour and Welfare, Health Insurance Bureau, Actuarial Research Div. "Trend of Medical Care Expenditures"

Two factors are causing the healthcare expenses to increase.

One, the advanced elderly population has increased. People covered by the advanced elderly medical service system increased by 10% to 16.5 million in 2016

from 14.94 million in 2012. This figure is expected to increase further because Japan's largest demographic, the baby boomer generation born between 1947 and 1949, will join the range of the advanced elderly in the first half of the 2020s.

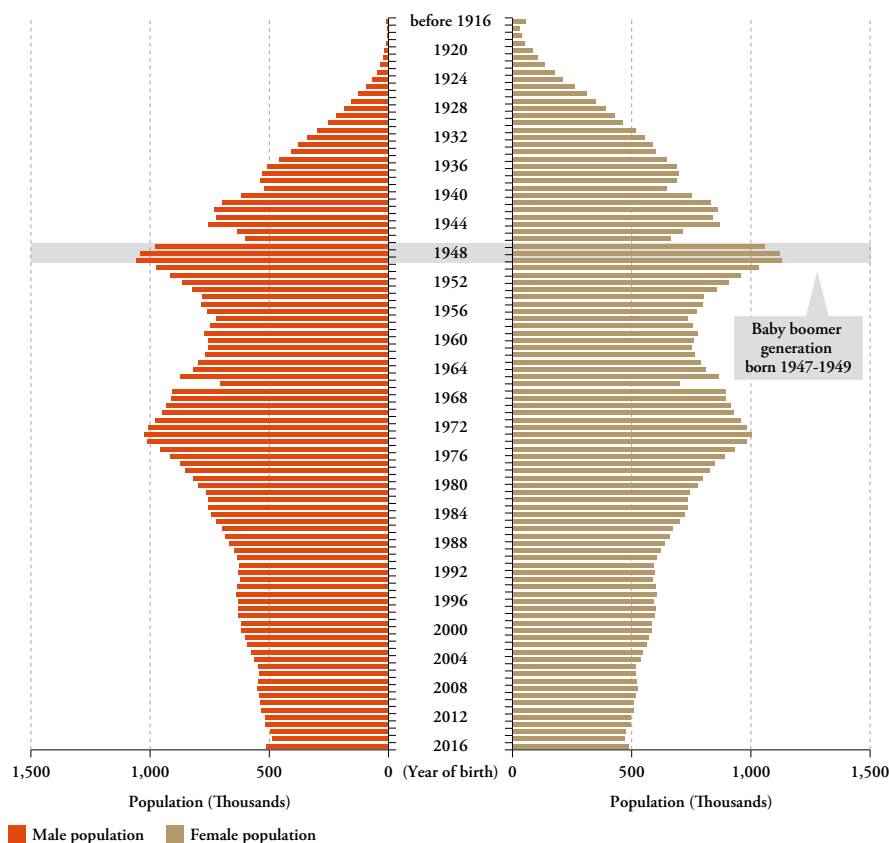
Figure 2: Average Life Expectancy by Gender and Ratio of Advanced Elderly to Total Population



Reference: Ministry of Health, Labour and Welfare
 Ministry of Internal Affairs and Communications, Statistics Bureau



Figure 3: Population Distribution by Age



Source: Ministry of Internal Affairs and Communications, Statistics Bureau, “Population Estimates”

Two, per capita healthcare expenditures have been increasing since fiscal 2007. In particular, per capita healthcare expenditures of the advanced elderly are increasing considerably and reached around 900 thousand yen in recent years. At the same time, medical expenditures per incident per insured have also trended upward. The highest healthcare expenditure in one particular month for one insured person set a record of 106.94 million yen in 2015. Data up to fiscal 2015 show that the number of cases of healthcare expenditure exceeding 10 million yen in a particular month for a single insured rose for two consecutive years and hit almost 500 cases.

Public healthcare expenditures are forecast to increase as society continues to age, while revenue is forecast to decrease due to the declining birthrate. To address this situation and maintain the public healthcare insurance system, the government is implementing policies to increase premium income and reduce expenditures.

The declining birthrate and aging population have also affected private insurance provided by life insurance companies. The standard mortality table was revised in April 2018 because of the increase in life expectancy, and life insurance companies also reviewed premiums. At the same time, insurers have also raised the maximum eligible age so that elderly people can also obtain insurance, and have diversified their product lines with insurance for dementia and long-term care.

Forecasts suggest that the birthrate will fall further while the population continues to age. Both public and private insurance must address these issues.

2. Overview of Business Results for Fiscal 2017

The fiscal 2017 business results for 41 life insurance companies are as follows:

(1) Total Amount of New Business

During the fiscal year ended March 31, 2018 (fiscal 2017), the total insured amount of new business decreased by 16.2% to 57.4 trillion yen for individual life because sales of yen-denominated savings insurance decreased as the asset management environment deteriorated. The total insured amount of new business decreased by 56.6% to 4.8 trillion yen for individual annuity insurance because the decrease of the standard valuation interest rate in April 2017 and the deteriorating asset management environment led life insurance companies to scale back sales of yen-denominated savings insurance.

(2) Total Amount of In-force Business

The total insured amount of in-force business for individual life decreased by 1.2% year-on-year to 853.0 trillion yen, which was essentially unchanged from the previous fiscal year despite the decrease in the total insured amount of new business. Similar to the trend of total insured amount of new business for individual insurance, the total insured amount of in-force business for individual annuity insurance decreased by 2.2% to 105.5 trillion yen.

(3) Premium Revenues and Total Assets

Total premium revenues decreased by 4.0% year-on-year to 33.8 trillion yen due to reduced sales of yen-denominated savings insurance. Similar to the previous fiscal year, total assets increased by 1.5% to 381.3 trillion yen due to the increase in foreign securities.

3. Trends in the Life Insurance Industry

(1) Life Insurance Company Response to the Revision of the Standard Mortality Table

The Insurance Business Act prescribes the standard mortality table (SMT) as a fundamental component in calculating the standard policy reserve. The table was revised for the first time in 11 years since the 2007 revision. The revision reflected increased life expectancy and the mortality improvement.

The mortality rate on the revised SMT was reduced as the result of the increase in longevity, which made life insurance companies consequently reduce premiums for life insurance products sold on or after April 1, 2018 by up to 20%.

Some life insurance companies have also increased participation in par policies, sold on or before March 31, 2018. This is a means to distribute additional returns from the increase in longevity to policyholders, whose premiums were calculated according to SMT prior to the revision.

On the other hand, although the mortality rate in the revised SMT was also reflected in health products and premiums for such products were therefore expected to rise, Japanese life insurance companies have tended to hold premiums on popular health insurance products steady in recognition of the safety loading from the



expected morbidity rate that would absorb the increased costs from the mortality rate and in consideration of the impact that higher premiums would have on sales.

(2) Trends among Japanese Life Insurance Companies

Japanese life insurance companies have targeted international expansion in recent years by acquiring life insurance companies overseas. However, life insurance company acquisitions are also taking place in Japan.

Nippon Life acquired Mitsui Life in 2015 to flexibly provide products through bancassurance and agency channels. Furthermore, Nippon Life announced it would acquire 85% of foreign capital life insurance company, MassMutual Life Insurance Company (MassMutual Japan) and make it a subsidiary in 2018. MassMutual Japan entered the bancassurance market in 2004 and had an advantage in providing products for inheritance and gifts in the high net worth market. Nippon Life will expand in the agency and bancassurance channels through this acquisition, in addition to its own core sales representative channel, with the objective of further building its presence in the Japanese market. MassMutual Japan will be renamed on January 1, 2019 as Nippon Wealth Life Insurance Company Limited.

In addition, the FWD Group acquired AIG Fuji Life Insurance Company, Ltd. in 2017 and made it a subsidiary, FWD Fuji Life. The FWD Group is the insurance business unit of Pacific Century Group, which operates in three key businesses in Asia: financial services; telecommunications, media and technology; and real estate development. FWD Fuji Life is expected to leverage FWD's strength in digital technology in developing new products and improving sales channels.

Japan's life insurance industry still has not reorganized in a way similar to the domestic non-life insurance industry, which resulted in three large groups – Tokio Marine Holdings, MS&AD Insurance Group Holdings, and Sompo Holdings – that have a major share of the market. Whether major life insurance companies will integrate further or foreign companies continue to enter Japan's life insurance market remains a point of interest.

4. Product Trends

(1) More Insurance Products with Wellness Benefits

In recent years, the Japanese life insurance industry has been developing and selling insurance products that give policyholders incentives, such as premium discounts, for being healthy, so-called “wellness benefits.”

Table 1: Life Insurance Company Initiatives for Insurance Products with Wellness Benefits

Company	Product	Summary
Sumitomo Life	Vitality (launched July 2018)	Points for health promotion activities during the year determine premium discounts in the following year
Dai-ichi Life	Just (launched March 2018)	Premium discounts for submitting medical examination documentation and additional premium discounts for good health
Tokio Marine & Nichido Life	Aruku Hoken (launched July 2017)	Partial premium rebates depending on the number of steps counted by a wearable terminal or smartphone. The product name means "Insurance for Walkers."
Sompo Japan Nipponkoa Himawari Life	Linkx (launched April 2018)	Premium is reduced retroactively to the effective date and the policyholder can receive the difference in cash as contribution if smoking status, health, or other issues improve two to five years after the effective date.
Neo First Life (Dai-ichi Life Group)	KARADA+plus (launched April 2017)	Premium is calculated using actual age at policy inception, but is calculated using health age based on medical examination results and other criteria at the three-year renewal date.

One of the reasons this trend has gained traction is that Sumitomo Life has collaborated with Softbank and South African financial services company Discovery to initiate the Japan Vitality Project in July 2016. Vitality is a traditional insurance policy with a wellness program rider, which is a mechanism that encourages ongoing health promotion activities. The companies collect policyholder data including the results of policyholder health examinations, membership usage at fitness gyms, and data measured by wearable devices. Depending on the results, policyholders can receive substantial premium discounts in the following fiscal year. This mechanism also provides benefits such as discounts on associated products and services. Planned for launch in summer 2018, Vitality is expected to attract health-conscious people.

Future development of an array of insurance products with wellness benefits is expected. In developing these products, insurance companies must gather and analyze personal health-related data for use in calculating their premium rates. Insurance companies are therefore collaborating with companies and academic institutions that can acquire daily lifestyle information. The development trend of such insurance products with wellness benefits may significantly influence not only insurance companies themselves, but also their partners in industries such as healthcare and digital technology.



(2) Diversifying Insurance Needs Due to Social Change

Increasing longevity in Japan is bringing on an era in which people live to be 100. Japanese life insurance companies are therefore focusing on marketing life insurance products to insure against such longevity risk.

Tontine annuities have become particularly popular over the past several years. “Tontine” is a mechanism that increases the annuity benefit paid to living policyholders by suppressing death benefits. Given the recent increase in longevity and the need to hedge its risks, some Japanese life insurance companies have developed enhanced tontine products such as limited payment whole life annuity insurance for policyholders with issue age 50 and older.

Long-term care insurance has also become popular with the increase in longevity and the increase of the population in need of long-term care. Typical long-term care insurance includes 1) products linked to the public long-term care insurance system and 2) others subsidizing the payments made to nursing care providers. As the percentage of the population that requires long-term care is trending upward, it is expected that long-term care insurance will draw further attention.

In addition to products to hedge longevity risks, the industry is developing products to resolve social problems in Japan, including infertility treatment. The Japanese government is implementing policies to support households with married couples who want to have children in order to reverse the declining birthrate. In this context, the Japanese Financial Services Agency decided to allow private life insurance companies to market infertility treatment insurance in 2016. Infertility treatment represents a major outlay for households, with the cost of treatment until a child is born estimated at 1 million yen. Hopes are high that infertility treatment insurance will mitigate this expense, but as yet insurance companies are only offering a limited range of products. However, insurance companies are expected to develop products that address this insurance need, and the Japanese Financial Services Agency has publicly announced that some insurance companies have started studying product development for infertility treatment.

As they work toward launching insurance products for new risk, it is difficult for Japanese life insurance companies to estimate future trends for incidence, which is a challenge for them. However, we expect companies to continue diversifying their product lines to address changing social needs.

Company Overview

Profile

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

In acknowledgment of Toa Re's outstanding financial profile, credit rating agencies, Standard & Poor's Financial Services LLC, A.M. Best Company, Inc. and Japan Credit Rating Agency, Ltd., have assigned Toa Re ratings of A+, A and AA+, respectively. As of March 31, 2018, the Toa Re Group boasted total assets of 687.9 billion yen. Net premiums written during the fiscal year ended March 31, 2018, totaled 237.9 billion yen.

Mission Statement



ToaRe Mission Statement

Providing Peace of Mind

Toa Re aims to realize its mission by

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

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

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

respecting the creativity of our employees and valuing their contributions

conserving the environment and contributing to the community

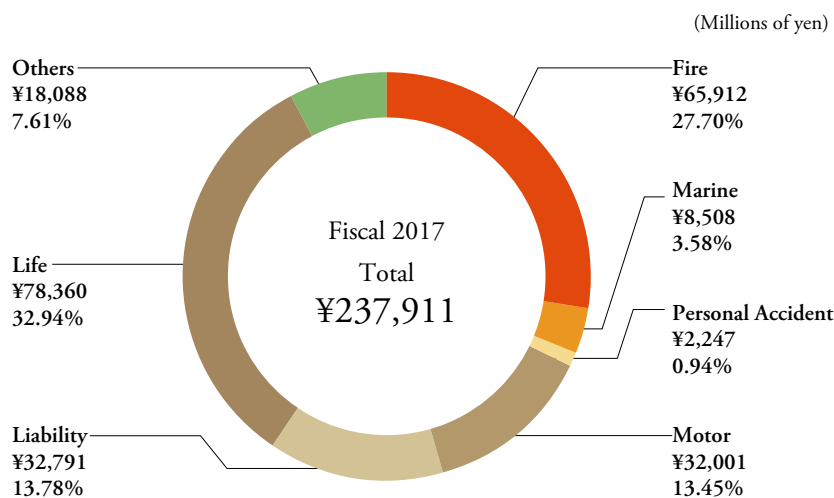
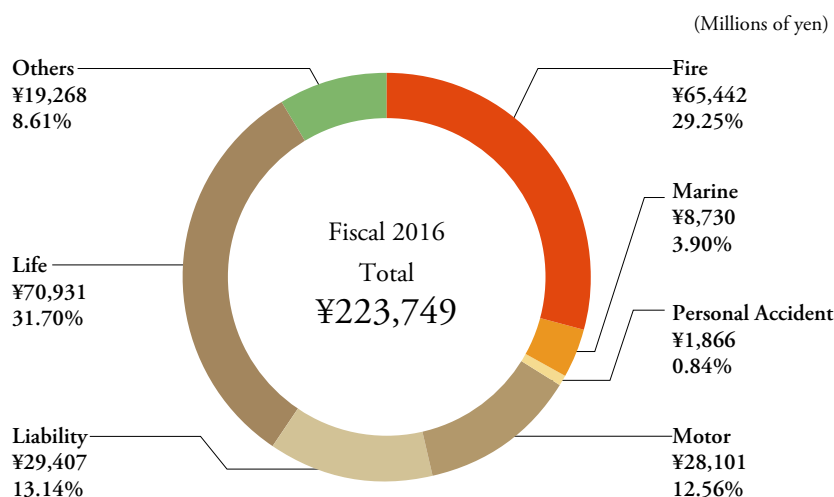


Consolidated Financial Highlights

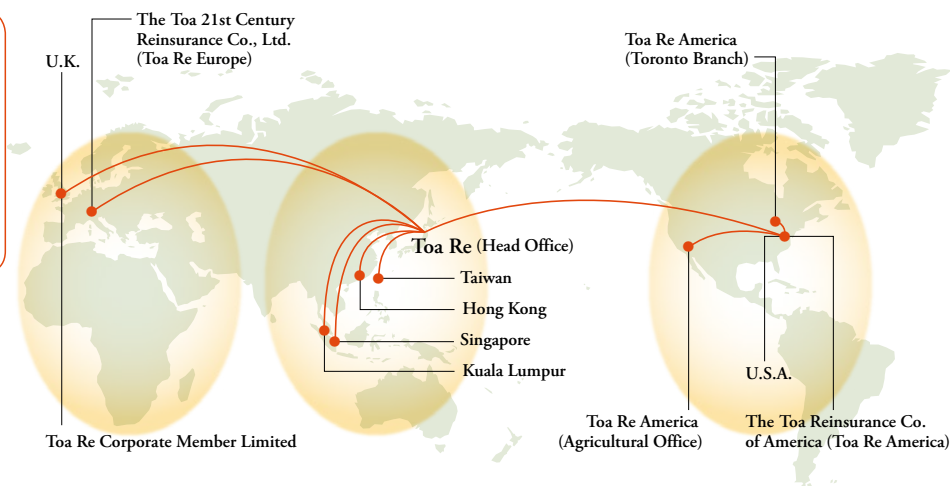
	Millions of yen					Thousands of U.S. dollars
	2018	2017	2016	2015	2014	2018
For the year ended March 31						
Ordinary income	¥254,934	¥251,462	¥245,114	¥246,264	¥246,820	\$2,399,604
Net premiums written	237,911	223,749	223,786	208,962	200,655	2,239,373
Ordinary profit	9,857	14,022	9,655	19,112	10,122	92,780
Net income attributable to owners of the parent	9,191	10,512	5,674	5,805	8,910	86,511
As of March 31						
Total net assets	200,550	191,907	180,826	199,334	160,289	1,887,707
Total assets	687,950	698,418	688,242	689,631	640,539	6,475,432

(Rate: ¥106.24 = US\$1)

Net Premiums Written by Class (Consolidated Basis)



Overseas Network



Locations

Branches

Singapore	50 Raffles Place #26-01, Singapore Land Tower, Singapore 048623 Telephone: 65-6220-0123
Kuala Lumpur	28th Floor, UBN Tower, 10 Jalan P. Ramlee, 50250 Kuala Lumpur, Malaysia Telephone: 60-3-2732-5911
Hong Kong	Room 801, 8th Floor, Tower 1, Admiralty Centre, 18 Harcourt Road, Hong Kong Telephone: 852-2865-7581

Subsidiaries

U.S.A.	The Toa Reinsurance Co. of America 177 Madison Avenue, P.O. Box 1930, Morristown, NJ 07962-1930, U.S.A. Telephone: 1-973-898-9480
	The Toa Reinsurance Co. of America (Agricultural Office) 18301 Von Karman Avenue, Suite 310, Irvine, CA 92612, U.S.A. Telephone: 1-949-474-1420
Canada	The Toa Reinsurance Co. of America (Toronto branch) 55 University Avenue, Suite 1700, P.O. Box 53 Toronto, Ontario, M5J 2H7, Canada Telephone: 1-416-366-5888
Switzerland	The Toa 21st Century Reinsurance Co., Ltd. (Toa Re Europe) Vulkanstrasse 106, 8048 Zürich, Switzerland
U.K.	Toa Re Corporate Member Limited 33 Gracechurch Street, London, EC3V 0BT, U.K. Telephone: 44-20-7082-2591

Representative Offices

U.K.	4th Floor of 33 Gracechurch Street, London, EC3V 0BT, U.K. Telephone: 44-20-7082-2591
U.S.A.	177 Madison Avenue, P.O. Box 1930, Morristown, NJ 07962-1930, U.S.A. Telephone: 1-973-898-9816
Taiwan	4F-2, No. 128, Section 3, Min Sheng East Road, Taipei 10596, Taiwan, R.O.C. Telephone: 886-2-2715-1015

Supplemental Data: Results of Japanese Major Non-Life Insurance Companies for Fiscal 2017, Ended March 31, 2018
(Non-Consolidated Basis)

(Unit: Millions of yen, %)

		MS&AD Holdings		Tokio Marine Holdings		Sompo Holdings		Toa Re
		Mitsui Sumitomo	Aioi Nissay Dowa	Tokio Marine & Nichido	Nisshin	Sompo Japan Nipponkoa		
Net Premiums Written	Fiscal 2017	1,500,326	1,222,017	2,144,780	141,820	2,168,009	185,570	
	Fiscal 2016	1,469,699	1,200,525	2,116,121	140,118	2,165,694	174,970	
Net Claims Paid	Fiscal 2017	836,385	660,699	1,225,285	75,185	1,272,130	131,092	
	Fiscal 2016	811,476	648,618	1,179,147	72,937	1,242,843	129,569	
Underwriting Profit (Loss)	Fiscal 2017	84,494	4,843	86,638	5,314	94,815	(1,372)	
	Fiscal 2016	81,799	39,531	116,131	8,121	112,474	3,770	
Ordinary Profit (Loss)	Fiscal 2017	262,552	5,616	325,847	7,574	175,220	5,115	
	Fiscal 2016	215,542	75,188	312,436	9,019	230,474	13,115	
Net Profit (Loss) for the Year	Fiscal 2017	198,237	15,620	253,895	5,346	170,032	4,987	
	Fiscal 2016	164,568	50,391	248,632	6,579	164,401	11,066	
Total Assets	Fiscal 2017	7,098,216	3,486,669	9,669,833	414,872	7,688,176	490,545	
	Fiscal 2016	6,777,076	3,498,264	9,524,466	417,919	7,568,779	507,469	
Ratio 1 Loss Ratio (%)	Fiscal 2017	61.8	59.2	62.0	59.7	64.4	70.6	
	Fiscal 2016	61.2	59.1	60.7	59.0	63.2	74.1	
Ratio 2 Expense Ratio (%)	Fiscal 2017	31.5	33.4	30.7	33.5	32.3	24.8	
	Fiscal 2016	31.2	33.5	30.8	33.1	32.0	24.9	
Ratio 3 Yield on Investments (Income) (%)	Fiscal 2017	2.04	2.21	3.16	1.39	1.87	2.05	
	Fiscal 2016	2.32	2.12	2.66	1.31	2.20	3.26	
Ratio 4 Yield on Investments (Realized Gains/Losses) (%)	Fiscal 2017	4.35	0.76	4.56	1.49	2.38	2.20	
	Fiscal 2016	3.63	2.12	3.88	1.17	3.28	3.17	
Ratio 5 Solvency Margin Ratio (%)	Fiscal 2017	701.1	784.0	827.3	1,321.2	735.1	831.5	
	Fiscal 2016	657.9	851.6	860.9	1,325.5	677.0	875.3	

Sources: Each company's financial statements of fiscal 2017

The Toa Reinsurance Company, Limited

6, Kanda-Surugadai 3-chome, Chiyoda-ku, Tokyo 101-8703, Japan

<https://www.toare.co.jp>



Providing Peace of Mind

The Toa Re Group is a global composite reinsurer that provides peace of mind to its clients by protecting them from a broad range of perils such as catastrophic earthquakes and typhoons, casualty events, crop damage, mortality and health care.

We at The Toa Re Group aim to be chosen by clients from across the world because of our ability to offer a secure long-term partnership of optimal solutions and strong financial security.



 **ToaRe Group**
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