The Toa Reinsurance Company, Limited

Japan's Insurance Market 2017

Japan's Insurance Market 2017

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To Our Clients

It gives me great pleasure to have the opportunity to welcome you to our brochure, 'Japan's Insurance Market 2017'. It is encouraging to know that over the years our brochures have been well received even beyond our own industry's boundaries as a source of useful, up-to-date information about Japan's insurance market, as well as contributing to a wider interest in and understanding of our domestic market.

During fiscal 2016, the year ended 31st March, 2017, the world economy generally remained on a moderate recovery track as the recovery of the U.S. and European economies continued despite weakness in certain emerging economies.

With the upturn in the world economy, the Japanese economy showed signs of a recovery in exports and production. Supported by firm personal consumption, the moderate recovery of the Japanese economy also continued.

In the non-life insurance industry in Japan, mainstay automobile insurance premiums written continued to trend upward because of the impact of the revision of products and their premium rates. On the other hand, fire insurance premiums written trended downward primarily because of a reaction against the last-minute demand before the revision of products in the previous fiscal year.

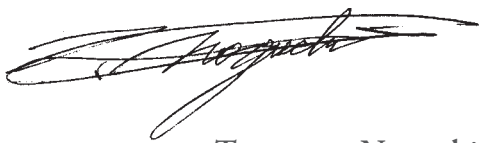
In the life insurance industry in Japan, reflecting the movement to curtail sales of single-premium products, new premiums written for such insurance products trended downward.

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

Going forward, fierce competition to win contracts is expected to continue given the abundant capacity of the reinsurance market. In addition, the need to respond to climate change, the increasing complexity of risks, and strengthened international regulations and frameworks is becoming more pronounced. The business environment is expected to continue to be challenging.

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

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



Tomoatsu Noguchi
President and Chief Executive
The Toa Reinsurance Company, Limited

1. Japan's Earthquake Insurance System: 50 Years of History and Its Significance

Tsuyoshi Suzuki
Managing Director
General Insurance Association of Japan

1. Introduction

Japan's earthquake insurance system for the household sector[1] celebrated its 50th anniversary in 2016. A number of major earthquakes occurred during these 50 years, but after each one Japan's non-life insurance industry took responsibility for rebuilding the lives of victims and reconstructing and restoring the affected regions. The 50-year history of Japan's earthquake insurance system is a story of how the combined wisdom of industry, government and academia first created and then improved a system that gives peace of mind to the residents of earthquake-prone Japan. I would like to express my deep appreciation for the contribution our predecessors made to this system and to look back on the history and significance of Japan's earthquake insurance system.

2. The Establishment of Japan's Earthquake Insurance System

(1) Before the Establishment of the System

Fire insurance first became available in Japan in 1887 at a time when domestic industry was developing during the Meiji Era. However, earthquake risk was not covered by fire insurance even though Japan is one of the most earthquake-prone countries in the world. The reasons impeding earthquake coverage included 1) the difficulty of application of the law of large numbers; 2) the massive losses that occur as a result of large-scale earthquakes; and 3) the problem of adverse selection.

The need for earthquake insurance to support swift recovery from disasters was an ongoing conversation from the Meiji Era onward. The government invited German economics professor Dr. Paul Mayet, who in 1878 advocated a compulsory national insurance system. The Ministry of Commerce and Industry outlined a draft of an earthquake insurance system in 1934 taking a cue from the 7.9 magnitude (M7.9) Great Kanto Earthquake[2] in 1923. No earthquake insurance system emerged during this period, however, due to issues including problems with government funding and insufficient public understanding of a national and compulsory insurance system.

(2) Establishment of the Earthquake Insurance System

The 7.5 magnitude Niigata Earthquake[3] that occurred in June 1964 spurred public opinion and the discussion about creating an earthquake insurance system made significant progress.

When the Niigata Earthquake occurred, the Finance Committee of the House of Representatives was reviewing a bill to partially amend the Insurance Business Act, and added the following supplementary resolution to the bill.

"As an earthquake-prone country, a problem with Japan's insurance system is that it does not pay claims arising from fire damage due to earthquakes. As part of the current review, we should instruct non-life insurance companies to address earthquake damage, and conduct promptly a fundamental study of an earthquake insurance system, with reference to the recently implemented atomic energy insurance system, to further enhance the non-life insurance system in Japan, a country that is prone to natural disasters."

Such were the circumstances and context surrounding the deliberations of the Insurance Council, which created Japan's earthquake insurance system by enacting the Act on Earthquake Insurance in 1966.

The earthquake insurance system was established with 1) a super long-term perspective that involves the government managing the balance structure; 2)

reinsurance underwritten by the government and maximum payment limits; and 3) structures including classification by location in order to develop an insurance product for earthquake risk, which is difficult to insure.

Initially, the maximum sum insured was 900,000 yen for dwellings and 600,000 yen for household contents. Coverage was limited to 30% of the coverage of the main policy (fire insurance) for the dwelling, with compensation only in the event of total loss. These benefits were significantly more limited than they are today.

3. A History of Revisions and Enhancements to the Earthquake Insurance System

The earthquake insurance system of today is the result of numerous revisions and enhancements based largely on experience and lessons learned from major earthquakes and consumer feedback. In particular, enhanced product features including increased coverage ratio and maximum sum insured were meaningful from the standpoint of increased compensation, and revision of the reinsurance scheme was meaningful in terms of the stable operation of the system.

(1) Changes in Product Features

The magnitude 7.4 Miyagi-oki Earthquake[4] that occurred in June 1978 was the impetus for changes in 1980 that introduced the half loss damage classification, changed the dwelling coverage limit range to 30% to 50% of the fire insurance coverage, and raised the maximum sum insured to 10 million yen for dwellings and 5 million yen for household contents.

The 6.7 magnitude Chibaken-Toho-oki Earthquake[5] that occurred in December 1987 and the Izu Peninsula offshore earthquakes[6] that occurred serially in July and August 1989 spurred the introduction of the partial loss damage category in 1991. The magnitude 7.3 Great Hanshin-Awaji Earthquake[7] that occurred in January 1995 was the impetus for further changes in 1996 that raised payout of insurance benefits for household contents from 10% to 50% of fire insurance coverage and increased the maximum sum insured to the current 50 million yen for dwellings and 10 million yen for household contents.

Table 1: Changes in Japan's Earthquake Insurance System (Significant Earthquakes and System Revisions)

June 1, 1966	Enforcement of Act on Earthquake Insurance Coverage limit: 30% of Fire insurance Maximum sum insured: Buildings – 0.9 million yen, Household contents – 0.6 million yen Damage categories: Total loss only (Payment ratio 100%)	1964 Niigata Earthquake
July 1, 1980	Coverage limit: 30% – 50% of Fire insurance Maximum sum insured: Buildings – 10 million yen, Household contents – 5 million yen Damage categories: Total loss (100%), Half loss (Buildings – 50%, Household contents – 10%)	1978 Miyagi-oki Earthquake
April 1, 1991	Coverage limit: 30% – 50% of Fire insurance Maximum sum insured: Buildings – 10 million yen, Household contents – 5 million yen Damage categories: Total loss (100%), Half loss (Buildings –50%, Household contents –10%), Partial loss (5%)	1987 Chibaken-Toho-oki Earthquake 1989 Izu Peninsula offshore earthquakes
January 1, 1996	Coverage limit: 30% – 50% of Fire insurance Maximum sum insured: Buildings – 50 million yen, Household contents – 10 million yen Damage categories: Total loss (100%), Half loss (50%), Partial loss (5%)	1995 Great Hanshin-Awaji Earthquake
January 1, 2017	Coverage limit: 30% – 50% of Fire insurance Maximum sum insured: Buildings – 50 million yen, Household contents – 10 million yen Damage categories: Total loss (100%), Large Half loss (60%), Small Half loss (30%), Partial loss (5%)	2011 Great East Japan Earthquake

Note: Underlined parts show the revised conditions.

The magnitude 9.0 Tohoku Pacific Ocean Earthquake,[8] otherwise known as the Great East Japan Earthquake, that occurred in March 2011 led to recent earthquake insurance system revisions. Claims paid exceeded 1 trillion yen within three months following the earthquake. This helped victims rebuild their lives quickly, but the massive outlays also depleted the system's reserves. This gave rise to concerns about the system's reliability and durability and debate about its viability as an insurance product.

Therefore, the Ministry of Finance formed a project team in 2012 to study issues including the durability of the earthquake insurance system and its viability as an insurance product. It followed up with meetings about the project team's work to coordinate the direction of future work associated with the system's viability.

Japan's earthquake insurance pays claims according to damage categories, regardless of the actual amount of damage, to ensure quick, fair assessment. In 2012, the system had three damage categories: total loss, paying 100%; half loss, paying 50%; and partial loss, paying 5%. Some members of the Ministry of Finance's project team expressed the opinion that some policyholders were dissatisfied with the current system because claims paid for partial and half loss differed greatly based on a nominal difference in damage.

Accordingly, the former three damage categories were further subdivided into four categories by dividing the former half loss category into the Large Half loss category paying 60% and the Small Half loss category paying 30%. This approach minimized the impact on quick damage assessment while aligning the claims payment ratio with actual damage.

(2) Changes to the Reinsurance Scheme (Division of Responsibility between the Public and Private Sectors and Limit on Total Amount of Insurance Claims to be Paid)

It is difficult to apply the law of large numbers, which is the basic premise of any insurance system, for earthquake risk. The government therefore underwrites reinsurance to prepare for the payment of earthquake insurance claims in the future, and accumulates reinsurance premiums as a policy reserve in the Earthquake Reinsurance Special Account. Private insurance companies also underwrite a portion of the reinsurance of earthquake insurance to an extent that will not interfere with the payment of claims from other classes of business, and accumulate the reinsurance premiums in a reserve. However, the government's ability to assume liabilities has limits, so the system has a predetermined cap on the total amount of insurance claims to be paid per earthquake (the total payment limit).

The total payment limit was originally 300 billion yen when the system was established. It has been raised periodically in earthquake insurance system enhancements in accordance with increased risk. Earthquake insurance penetration increased rapidly after the Great Hanshin-Awaji Earthquake. Claims paid for this earthquake depleted the contingency reserves of private insurance companies, but the insurance liability rose because the total payment limit increased. Consequently, the contingency reserve deficits of private insurance companies expanded. Given these circumstances, contingency reserves became the criterion for private insurance company liability.

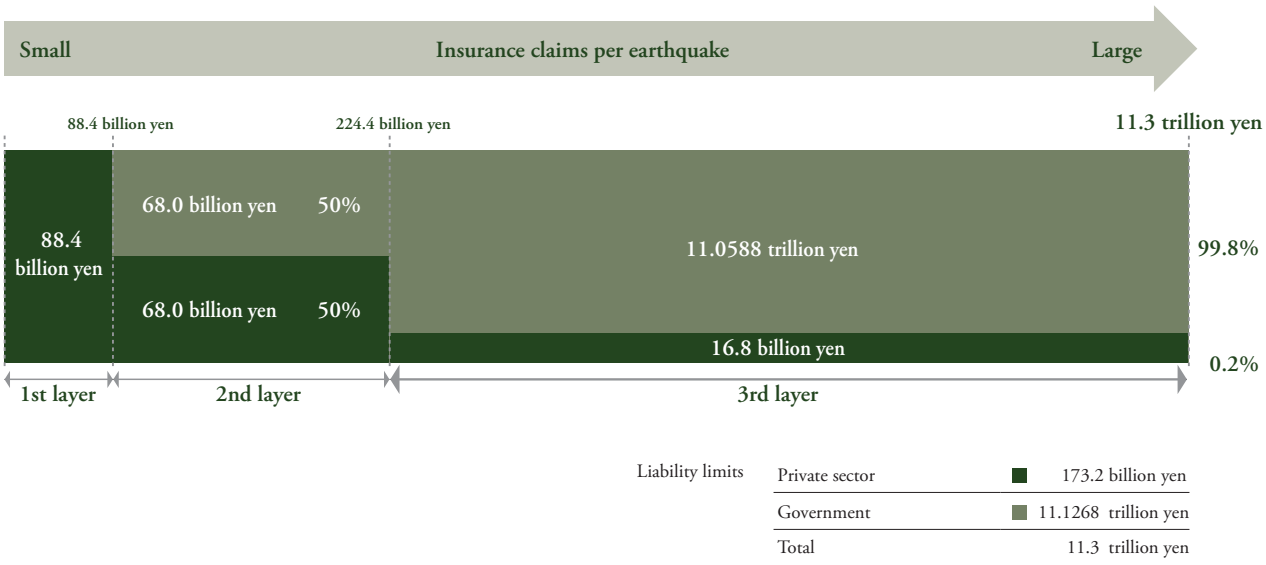
Subsequently, payment of claims associated with the Great East Japan Earthquake and other factors caused the contingency reserve deficit of private insurance companies

to expand to 780 billion yen. Private insurance company liability did not automatically decrease if contingency reserves for earthquake insurance declined due to payment of claims. This mechanism exposed private insurance companies to the risk of massive losses should a series of earthquakes occur in quick succession.

The Ministry of Finance's project team addressed this situation in its report, which placed priority on reviewing system durability. Accordingly, the 2013 review of the reinsurance scheme set the liability per earthquake of private insurance companies below their contingency reserves, and introduced a system that gives private insurance companies capacity to pay claims even if a massive earthquake follows one that has already reduced contingency reserves. This review contributed significantly to the durability and reliability of the earthquake insurance system because it resolved the issue of private company liability in excess of contingency reserves and eliminated excessive private company liability in the event of a series of earthquakes.

The total payment limit has been 11.3 trillion yen since April 2016.

Table 2: Public and Private Liability and Total Payment Limit (As of April 2017)



Liability limits		
Private sector	■	173.2 billion yen
Government	■	11.1268 trillion yen
Total		11.3 trillion yen

4. The Kumamoto Earthquake and the Earthquake Insurance System

On April 14, 2016, a magnitude 6.5 earthquake (foreshock) occurred in the Kumamoto area, followed by an April 16 second earthquake (main shock) with the same hypocenter in the Kumamoto area, with a magnitude of 7.3.[9]

Non-life insurance companies collaborated to pay claims so that victims could rebuild their lives quickly. The insurance companies completed payment of claims totaling 301.9 billion yen as of June 13, 2016, about two months after the earthquakes. Payment of claims subsequently increased to 377.3 billion yen as of March 31, 2017, the second largest sum of claims paid after the Great East Japan Earthquake.

Table 3: Major Earthquakes and Earthquake Insurance Claims Paid

	Earthquake	Date of Occurrence	Claims Paid (Billions of yen)
1	Great East Japan Earthquake	March 11, 2011	1,270.6
2	Kumamoto Earthquake	April 14, 2016	377.3
3	Great Hanshin-Awaji Earthquake	January 17, 1995	78.3
4	Miyagi-oki Earthquake	April 7, 2011	32.4
5	Western Fukuoka-oki Earthquake	March 20, 2005	17.0

Note: Insurance claims paid for the Kumamoto Earthquake were surveyed by the General Insurance Association of Japan (as of March 31, 2017). Regarding other earthquakes, the figures are based on the survey of the Japan Earthquake Reinsurance Co., Ltd. (as of March 31, 2016). Insurance claims paid are rounded to the nearest hundred million yen.

5. Conclusion

The earthquake insurance system has helped many victims rebuild their lives and has become stronger and more stable by employing lessons learned. Increasing the penetration rate is essential for the system to work more effectively.

Currently, the earthquake insurance system has a household penetration rate of 29.5%[10] and the ratio of fire insurance policies with an earthquake rider attached[11] is 60.2%. Potential disasters such as an earthquake beneath metropolitan Tokyo or a massive earthquake in the Nankai Trough are serious concerns. The General Insurance Association of Japan will contribute to secure, safe lives for the people of Japan by further promoting the penetration of earthquake insurance to help disaster victims rebuild their lives.

Notes: 1. In this document, "earthquake insurance system" refers to household earthquake insurance. Household earthquake insurance covers dwellings (specifically for residential or partial-residential use) and fixtures and fittings (household contents). It does not cover earthquake-related losses in the corporate sector.

2. This earthquake resulted in over 105,000 people dead or missing, over 211,000 buildings completely or partially destroyed, and more than 212,000 residences destroyed by fire.
3. This earthquake resulted in 26 people dead, 447 people injured, 1,960 buildings completely destroyed, 6,640 buildings partially destroyed, 15,297 buildings flooded, and 67,825 buildings damaged.
4. This earthquake resulted in 28 people dead or missing, 1,183 buildings completely destroyed, 5,574 buildings partially destroyed, and numerous buildings damaged.
5. This earthquake completely destroyed 10 buildings and damaged over 60,000 buildings.
6. This earthquake damaged a large number of buildings.
7. This earthquake resulted in 6,437 people dead or missing, over 40,000 people injured, over 240,000 buildings completely or partially destroyed, and over 6,000 buildings completely or partially destroyed by fire.
8. According to the Fire and Disaster Management Agency, as of September 1, 2016, this earthquake resulted in 19,475 people dead, 2,587 people missing, 6,221 people injured, 121,744 residential buildings completely destroyed, and more than 1,158,000 buildings partially destroyed, damaged, or damaged by above- or below-floor flooding.
9. According to the Fire and Disaster Management Agency, as of December 27, 2016, this series of earthquakes caused damages primarily in Kumamoto Prefecture and resulted in 178 people dead, 2,699 people injured, 8,388 residential buildings completely destroyed, and more than 187,000 buildings partially destroyed or damaged.
10. Figure obtained by dividing the number of earthquake insurance policies at the end of 2015 by the number of households as per the Basic Resident Register as of January 1, 2016. Source: General Insurance Rating Organization of Japan materials.
11. Percentage of residential property fire insurance policies with an earthquake insurance rider attached during fiscal 2015. Source: General Insurance Rating Organization of Japan materials.

2. Japan's Individual Life Insurance Industry Confronts Major Changes in the Structure of Society

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1. Market Size (In-Force Policy Basis) Contracting as Working Population Ratio Decreases

Reflecting the peak in the working population ratio in Japan in fiscal 1997, the individual life insurance market in Japan peaked at 1,496 trillion yen in fiscal 1996 on the basis of total amount of business in force, but then decreased by about 40% to 859 trillion yen in fiscal 2015 (Figure 1). The working population ratio and total amount of business in force are highly correlated. The working population ratio is forecast to remain at current levels until fiscal 2030, so total amount of business in force is not likely to decrease significantly. Subsequently, the working population ratio is forecast to decrease again to 50% or less in fiscal 2038, so total amount of business in force is forecast to fall to the level of fiscal 1988, or about 30 years before fiscal 2017. The long-term outlook is that opportunities to underwrite risk in the life insurance market will decrease in a changing operating environment because individual life insurance products, which are currently predominant for life insurers, will no longer sell at the same levels.

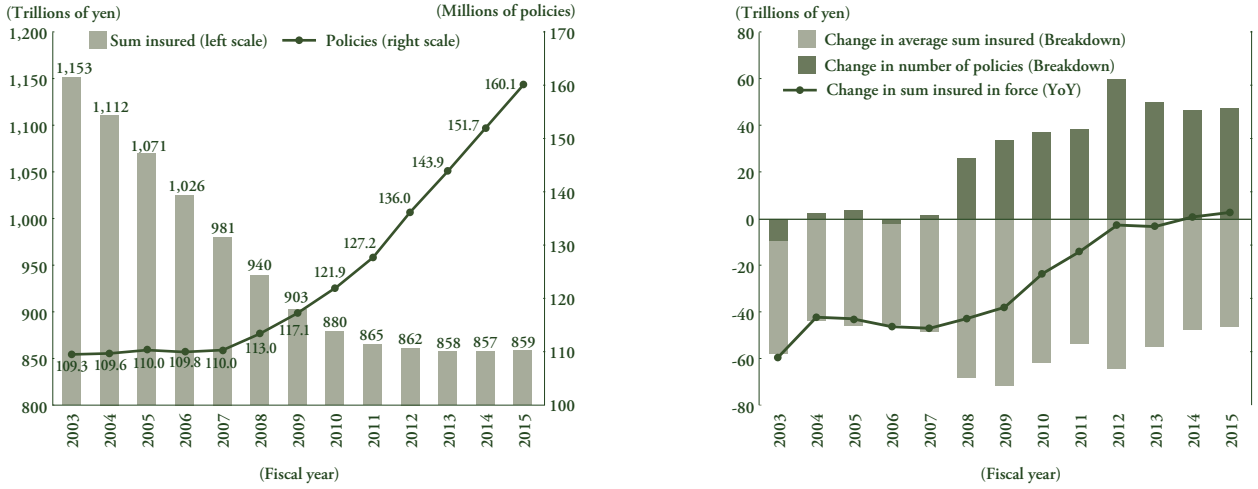
Figure 1: Trends in Total Amount of Business In Force of Individual Life Insurance and the Working Population Ratio

Source: Created by Daiwa Institute of Research using data from the National Institute of Population and Social Security Research, Statistics Bureau of the Ministry of Internal Affairs and Communications, and the Life Insurance Association of Japan.

However, Figure 2 (left) shows the current situation. The total amount of business in force increased slightly in fiscal 2015 after decreasing for more than 10 years. This was due to large, ongoing increases in the number of policies in force and the slowing decrease in average sum insured.

Over the past several years, the number of policies has trended upward while the average sum insured (death benefit per policy) has trended downward in individual insurance (excluding individual annuity insurance) as a whole. Thus, insurance products have become simple and discrete and the sum insured per policy has decreased. Specifically, the number of policies has increased supported by the higher demand for health insurance such as medical and cancer insurance, and the trend toward policyholders purchasing individual products. These products have been decoupled and combine only the desired benefits from premade comprehensive large packages. At the same time, the structure of the market has evolved, with average sum insured decreasing due to weakness in sales of death protection products.

Figure 2: Trends in Sum Insured and Number of Individual Life Insurance Policies in Force (Left) and Breakdown of Change in Sum Insured of Policies in Force (Right)



Source: Created by Daiwa Institute of Research from *Life Insurance Business in Japan*, the Life Insurance Association of Japan

2. Diversification of Individual Life Insurance Needs: Response to New Life Insurance Risk

The future expansion of the individual life insurance market is contingent upon the ability of life insurance companies to address diversifying life insurance needs and identify potential needs. Generally, however, the diversification of individual life insurance needs really means the compartmentalization of needs, in that consumers who understand the risks to themselves that life insurance protects against, such as mortality risk or longevity risk, actively select the products that correspond to risks relevant to them. Apparently, however, the number of consumers who actively select insurance products relevant to their needs has not increased significantly. What then explains this phenomenon of a market that is expanding due to diversification?

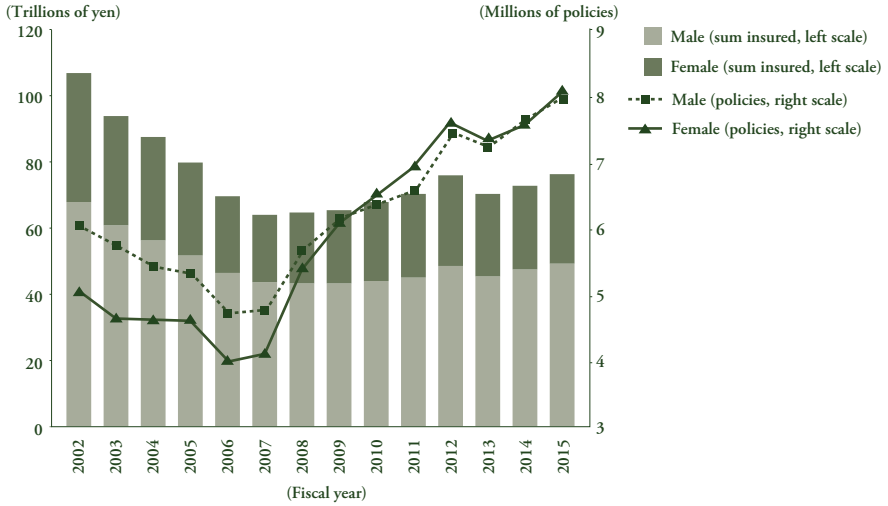
One explanation is that the elderly demographic is increasing even though the total population is decreasing. Deaths exceeded births in 2005, so the total population started to decrease, and the percentage of people age 60 or older has continued to increase compared to the total population decrease. This demographic may be more concerned with longevity risk than with mortality risk, which would explain growth from life insurance products geared to seniors. In addition, products geared to seniors such as single-premium whole life policies have relatively high premiums, which may explain growth in premium income of life insurance companies.

Another explanation is that the number of households is trending upward even though the population is decreasing. The primary factor behind this trend is the rise in the number of one-person households and nuclear family households. Yet the benefits of this expanding base of needs that relates to the growth in the number of households will not be available for long, because the number of households is forecast to peak at 53.1 million in 2020 and then start to decrease.

The number of female policyholders is also increasing. Since fiscal 2010, the number of female policyholders has generally been greater than the number of male policyholders on a new business basis (Figure 3). This trend is driven by the changing social environment as illustrated by greater diversity in family composition, including

the increase in the number of households headed by a single mother, the trend toward later marriage and the growing number of working women, as indicated by the increase in the number of households mentioned in the previous paragraph.

Figure 3: Policyholders by Gender on a New Business Basis



Source: Created by Daiwa Institute of Research from *Life Insurance Business in Japan*, the Life Insurance Association of Japan

These factors suggest the hypothesis that the diversification of needs today is an expansion in latent needs brought about by changes in the composition of Japan's population and the social environment along with the increase in the number of households.

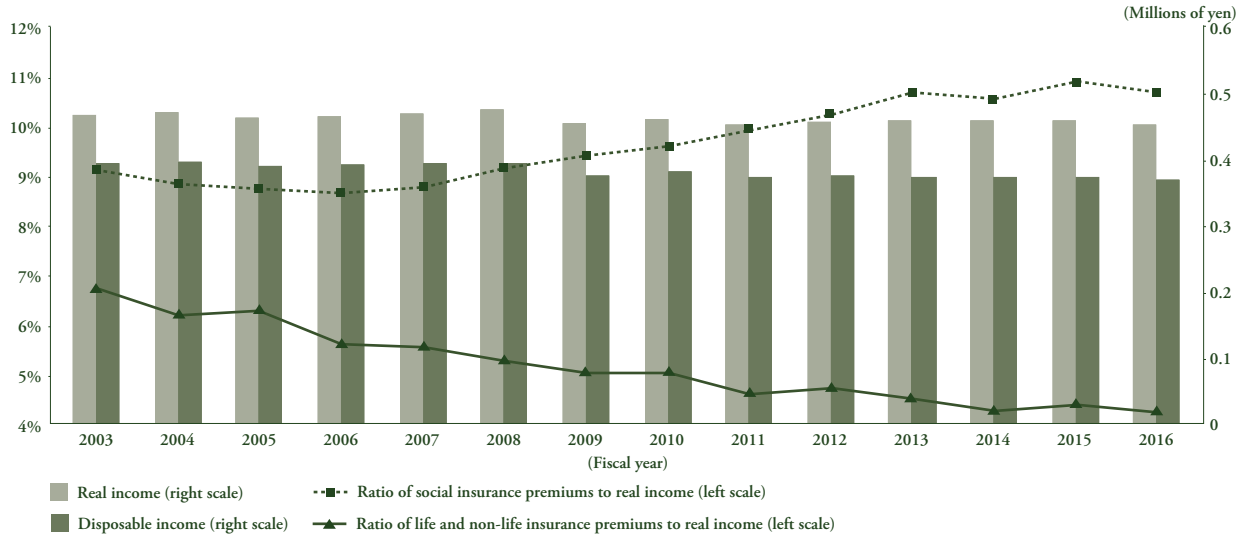
Ongoing development of advanced fintech will enable the analysis of massive amounts of medical claims data and the acquisition and analysis of detailed data through the use of sensors for individuals. This in turn will enable the development of life insurance products attuned to diverse latent needs. Currently, the Act on the Protection of Personal Information restricts the use of information by private companies, including medical claims data (medical payment statements) and medical examination data. However, Japanese life insurance companies are energetically turning to fintech, using artificial intelligence (AI) to calculate healthy life expectancy for individuals, using available databases, in order to sell life insurance products with variable premiums.

3. *Lower Consumer Income Is Reducing Premiums*

In addition to the above review of the number of life insurance policies, I would like to analyze the relationship between the premiums policyholders pay to life insurance companies and consumer household income. Real consumer income and disposable consumer income decreased after the financial crisis of 2008 and have basically remained flat since then, according to the *Family Income and Expenditure Survey* of the Ministry of Internal Affairs and Communications. However, the ratio of social insurance premiums to real income has increased while the ratio of premiums paid, including non-life insurance premiums, to real income has consistently decreased (Figure 4).

The burden of social insurance premiums will inevitably continue to increase due to structural issues if the birthrate continues to decline and society continues to age. The impact on premiums paid will be significant, suggesting that conditions will remain challenging for life insurance companies, both in the amount of premium income and in terms of the number of life insurance policies as discussed above.

Figure 4: Ratio of Social Insurance Premiums and Life and Non-Life Insurance Premiums to Monthly Average Real Household Income



Notes: 1. Refers to households in which the head of the household gains a salary from a company, public office, school, or other source.
2. Real income is the sum of cash income of all household members. Disposable income is real income less non-consumption expenditures including taxes and social insurance premiums. Insurance premiums include individual annuity insurance premiums and corporate pension plan contributions.

Source: Created by Daiwa Institute of Research from Statistics Bureau of the Ministry of Internal Affairs and Communications *Family Income and Expenditure Survey*

4. Changes in Underwriting Risk: Increasing Need for Longevity Risk Insurance, in particular Medical Insurance

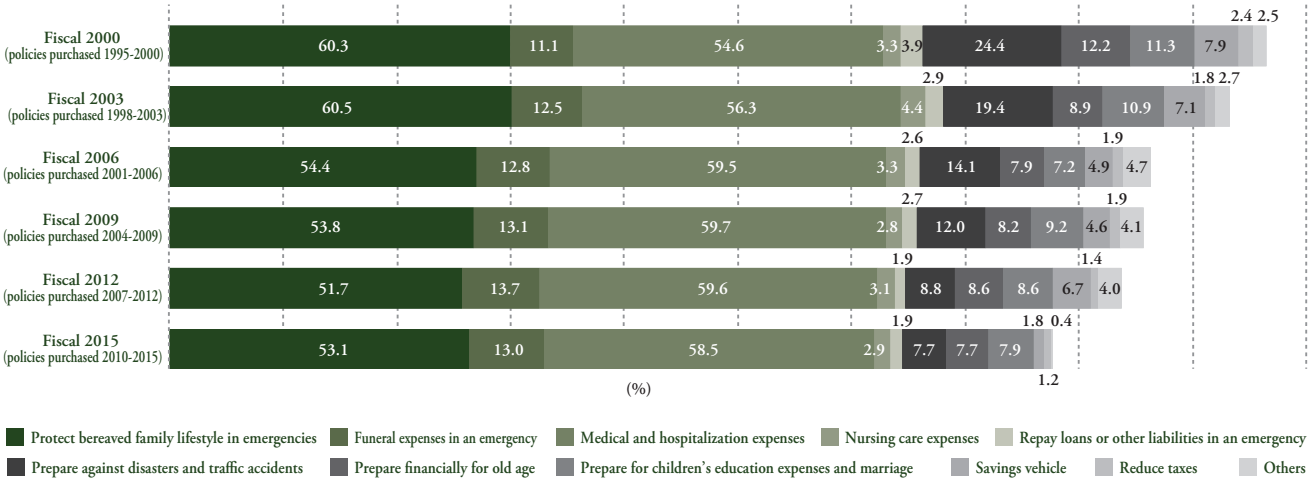
As discussed above, it appears consumer needs are transitioning from death benefit cover to longevity cover because the proportion of people age 60 and over is increasing.

Every three years, the Japan Institute of Life Insurance conducts its National Survey on Life Insurance, which includes investigations of the reasons consumers purchase life insurance (Figure 5). Death benefit was the reason for more than 60 percent of people who purchased life insurance in the fiscal 2000 survey. In the fiscal 2006 survey, however, the ranking of purpose for policyholders who purchased insurance for medical and hospitalization expenses, and those who purchased insurance for death benefit to protect bereaved family lifestyle in emergencies had reversed. Rising patient burden for medical expenses amid deteriorating health insurance finances backed this shift. In 2002, revisions to the Health Insurance Act and other regulations increased the health insurance burden (expenses paid to hospitals) of employees to 30% from 10%, and the system of fixed health insurance expenses for the elderly was revised to increase their burden. Regarding the reason for purchasing insurance, the rising public health

insurance burden is believed to be the reason behind the change from death benefit to medical and hospitalization expense coverage.

The number of policyholders who purchased insurance as a savings vehicle decreased significantly to 1.8% in the fiscal 2015 survey, from 6.7% in the fiscal 2012 survey. The incentive for policyholders to purchase insurance for savings and investment has apparently decreased, because the expected interest rate has fallen and premiums have increased.

Figure 5: Survey of Reasons Policyholders Purchased Insurance



Note: Survey of general households with two or more members. Percentages do not add up to 100% because multiple answers are allowed.
Source: Created by Daiwa Institute of Research from *National Survey on Life Insurance*, Japan Institute of Life Insurance

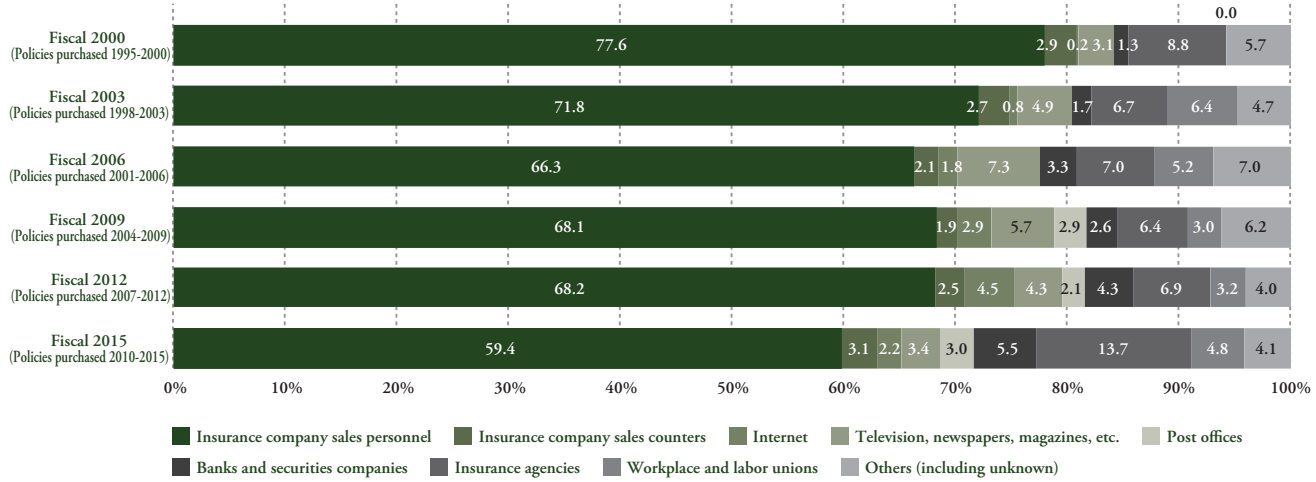
5. *Increased Sales Channel Access Options*

The Japan Institute of Life Insurance also looked at the channels used to purchase life insurance in the *National Survey on Life Insurance* mentioned earlier (Figure 6). Sales personnel of life insurance companies were the sales channel for nearly 80% of policyholders' life insurance product purchases from the mid-1990s through fiscal 2000. Sales channels subsequently became more diverse, however, with that figure decreasing to less than 70% in the fiscal 2006 survey and less than 60% in the fiscal 2015 survey. Insurance agencies stand out as a sales channel that is steadily gaining share. This channel's share rose substantially to 13.7% in the fiscal 2015 survey from 8.8% in the fiscal 2000 survey. In addition, all restrictions on bancassurance, insurance products sold by banks and securities companies, were lifted in December 2007, and this channel's share increased to 5.5% in the most recent fiscal 2015 survey from 1.3% in the fiscal 2000 survey.

Of particular note, the Internet channel surged to 4.5% in the fiscal 2012 survey from 0.2% in the fiscal 2000 survey, but then plummeted to 2.2% in the fiscal 2015 survey. The Internet was expected to be an excellent sales channel because web-based life insurance companies had been newly launched, but this channel has not received consumer support.

As discussed above, life insurance company sales personnel are still responsible for nearly 60% of insurance purchases. Sales personnel are apparently a highly appropriate sales channel given the unique characteristics of life insurance products.

Figure 6: Insurance Policy Sales Channels



Source: Created by Daiwa Institute of Research from *National Survey on Life Insurance*, Japan Institute of Life Insurance

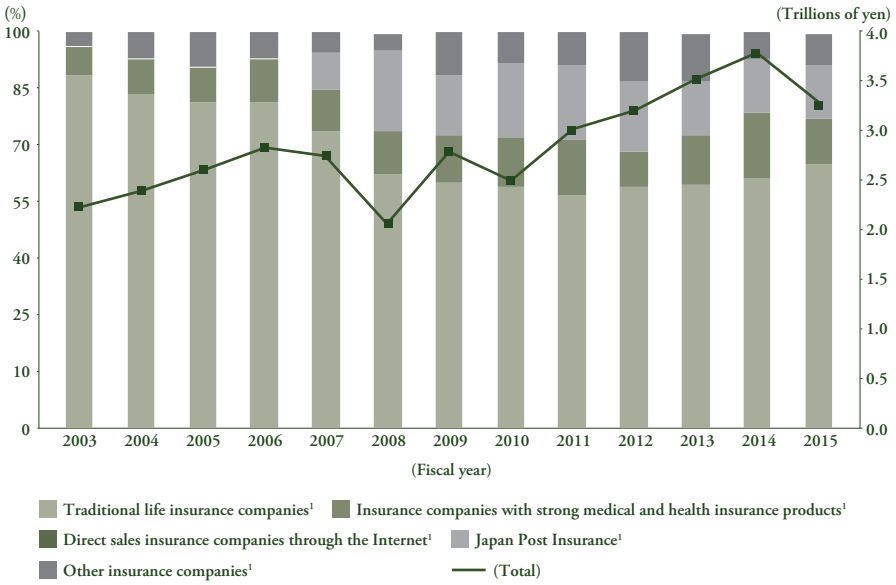
6. *Life Insurance Company Strategies and Their Impact on Earnings*

The management type of life insurance companies is essentially stock-type management. As the scale of total amount of business in force expands, core profit increases and therefore the revenue base becomes stable due to the nature of life insurance company businesses. This paper classifies insurance companies into five categories[1] – traditional life insurance companies, insurance companies with strong medical and health insurance products, direct sales insurance companies through the Internet, Japan Post Insurance Co., Ltd., and other insurance companies – and analyzes their core profits. Excluding direct sales insurance companies through the Internet, total core profits have been relatively stable, because mortality (morbidity) gains have been a buffer against the negative spread that results from incidents such as the financial crisis of 2008 (Figure 7).

Stable mortality (morbidity) gains are therefore essential for improving corporate value, because they are the basis for core profits for life insurance companies. At present, growth in medical and health insurance policies has enabled companies to secure morbidity gains that have compensated for lower mortality gains, due to the decrease in total amount of business in force. However, new policy trends indicate that the decrease in the amount of death benefit policies in force will continue in the future and the decline in mortality gains is unavoidable. Moreover, new policy trends in the medical and health insurance sector indicate that strong growth in the future is unlikely. Downward pressure on mortality (morbidity) gains is therefore expected to continue in the future. Life insurance companies must therefore reduce expenses[2] even more than they have, in order to compensate for the projected decrease in mortality (morbidity) gains and ensure administrative expense margins. At the same time, the operating environment is changing, and the approach life insurance companies use for taking asset management risks and setting the expected interest rate could alter

positive spreads, which would be a factor altering the corporate value of life insurance companies. More than ever, Japan's life insurance companies will need to devise various strategies, including business model reform and restructuring that go beyond the industry, as well as expanding global business operations.

Figure 7: Core Profits by Category for Japan's Life Insurance Companies



Source: Created by Daiwa Institute of Research from *National Survey on Life Insurance*, Japan Institute of Life Insurance

Notes: 1. This analysis categorizes 41 life insurance companies (2016) into five categories by business type and characteristics:

1) Nine traditional life insurance companies (Asahi, Sumitomo, Dai-ichi, Daido, Taiyo, Nippon (Nissay), Fukoku, Mitsui, Meiji Yasuda);
2) Ten life insurance companies with strong medical and health insurance products (AXA, American Family (Aflac), Sompo Japan Nipponkoa Himawari, ORIX, Zurich, Tokio Marine & Nichido, AIG Fuji, Mitsui Sumitomo Aioi, Met Life, Medicare);
3) Three direct sales insurance companies through the Internet (AXA Direct, Neo First (former Sompo Japan DIY), Lifenet);
4) Japan Post Insurance; and
5) Eighteen other life insurance companies (NN – formerly ING Life, Allianz, Cardif, Crédit Agricole, Gibraltar, Sony, AEGON Sony, Dai-ichi Frontier, T&D Financial, SBI – formerly PCA, Fukokushinrai, Prudential, Prudential Gibraltar Financial, MassMutual, Manulife, Mitsui Sumitomo Primary, Midori, Rakuten).

Note: Company names are abbreviated and as of May 16, 2017. Data for merged companies are retroactive totals for convenience. Reference: *Toyo Keizai Weekly*, Special edition for Life Insurance and Non-life Insurance.

2. Expenses including those required to sell new insurance policies, to administer policies in force and for procedures related to claims payment.

3. The Evolution of Marine Analytics

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As one of the oldest forms of insurance, marine insurance has seen many changes in the world around it. It has pressed ahead, steadfast and focussed on the standards and practices established by generations of underwriters, steering through a multitude of underwriting cycles. Whilst the emergence of natural catastrophe modelling firms such as RMS, AIR and RQE have dramatically shifted the landscape in the property insurance market, their impact in the marine environment has been much less significant to date. However, as models become more prevalent in the operation of insurance companies — and recent loss activity reminds us of the potential for the unexpected to destabilise broader business strategies — focus is beginning to turn towards the relative analytical infancy of marine insurance as an area ripe for expansion.

The establishment of catastrophe modelling in the underwriting of property insurance has created a framework for capturing key pieces of information at the point of underwriting the original risk. The rigor in which the data is captured provides an additional element of knowledge of the underlying risk over and above the probabilistic loss estimates a catastrophe model will generate. Aggregated sum insured in key regions and movements in annual figures provide high-level management information to assess underwriting at a basic, and yet informative, level.

Until now the challenges facing marine insurers have prevented a significant foray into the modelling arena. These challenges include considerations such as: the complexity of the coverages offered (or indeed excluded) under the original policy; unstructured data capture and storage; fluidity of exposure movement and unknown concentrations; and limited extreme loss activity with consistent characteristics, to name but a few.

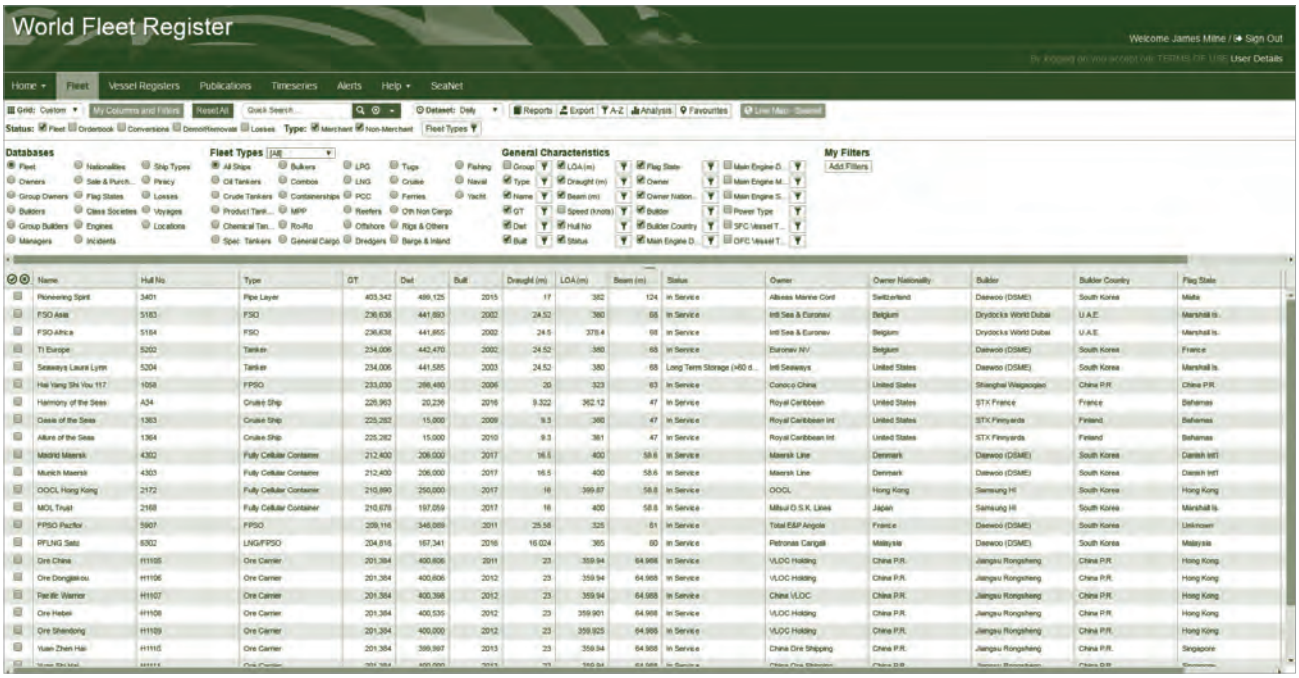
Actuarial and catastrophe modelling teams have developed techniques and approaches to create pricing and capital models for their own internal use, enabling integration of marine exposures into the models already established for the more capital intensive property classes. Unlike the property classes, however, these marine models rely upon subjective opinion and interaction with the underwriting teams as much as they do upon the core data provided. As a result, a standardised quantification of marine risk has not been established and as such, pricing in the reinsurance market represents a relatively volatile exercise where consensus of a fair price may require significant (and potentially repetitive) discussion. This has restricted the engagement with Insurance Linked Security ("ILS") markets, with trading in the secondary markets being almost non-existent.

However, looking forward there are a number of positive developments that have the potential to enable marine models to make big leaps forward.

Whilst the underlying marine hull insurance policy has not dramatically changed in concept, the design and engineering associated with the insured risk (the vessel) has adapted to the economic and environmental pressures that the marine market has faced. In a similar fashion, information capture relating to the vessels that make up the world fleet has become standardised with companies such as IHS Fairplay™ and Clarksons Research™ providing on-line portals recording core pieces of information that may support the underwriting of a vessel or fleet. This

information extends beyond gross tonnage ("GT"), vessel type, and year of build, to include additional information such as flag, equipment, yard of build, and casualty activity. Whilst an insurance loss is not explicitly recorded within these casualty listings, the circumstances surrounding the incident provide a strong foundation upon which underlying trends can be investigated.

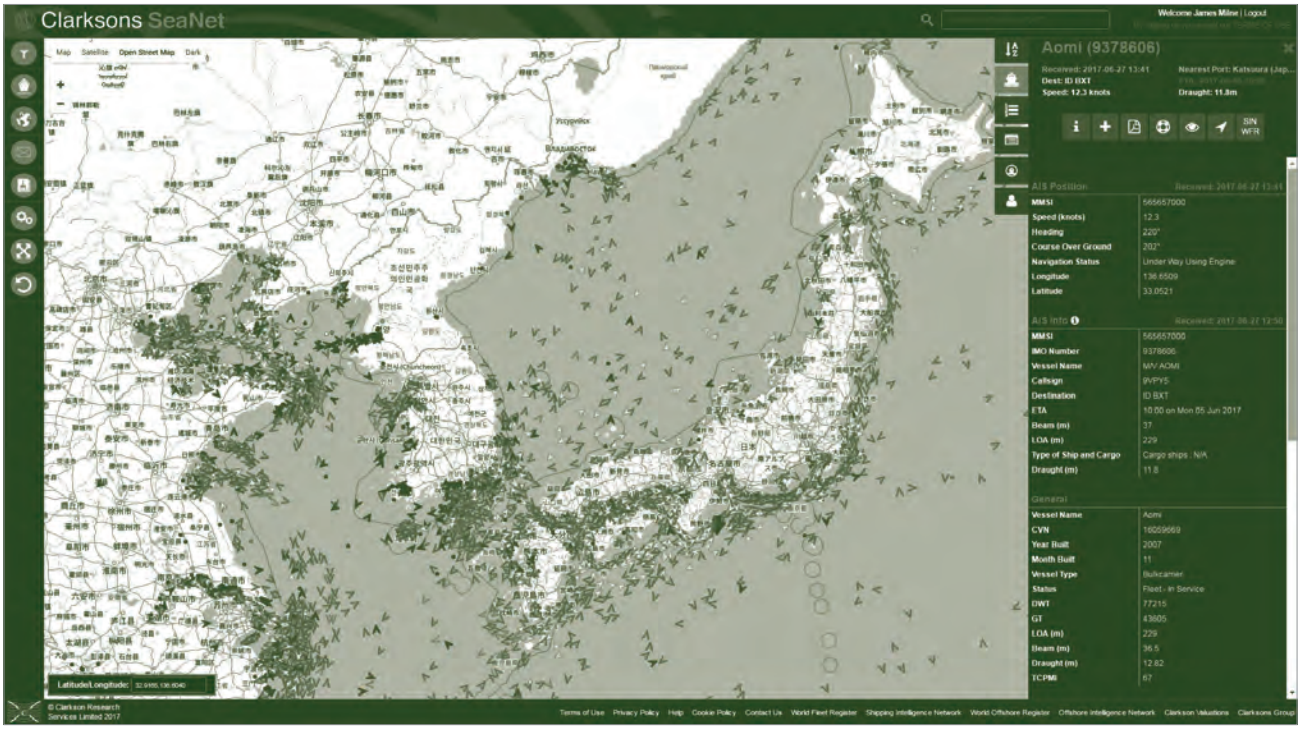
Figure 1: Clarksons World Fleet Register



Source: Clarkson Research

In addition to recording the underlying vessel characteristics, the live movement of vessels can now be captured in on-line sites such as MarineTraffic.com, VesselFinder.com, IHS Sea-web and Clarksons SeaNet. These sites rely on the transmitted on-board Automatic Identification System ("AIS") information being captured by land based receivers and satellites, with a regular stream of positional information being fed into them. As the number of vessels that must have their AIS transmitters turned on increases due the legal requirements, the global capture of vessel movements will also expand. Some platforms go so far as to provide the historic movement of vessels, which can be exported, allowing underwriters to establish more extensive patterns of behaviour, thereby introducing new exposure measurements to supplement the traditional rating factors such as GT or age. Numbers of port calls or vessel miles can then become potentially credible measures, provided the underlying data is consistently recorded and utilised.

Figure 2: Real-time Vessel Movement (Centred on Japan)



Source: Clarksons SeaNet

The impact of satellite imagery has also revolutionised how the aggregation of exposures can be managed and visualised. Tools such as SpatialKey provide useful means by which deterministic scenarios can be overlaid against insured exposures and assist in reporting the potential impact post event, which can be time critical.

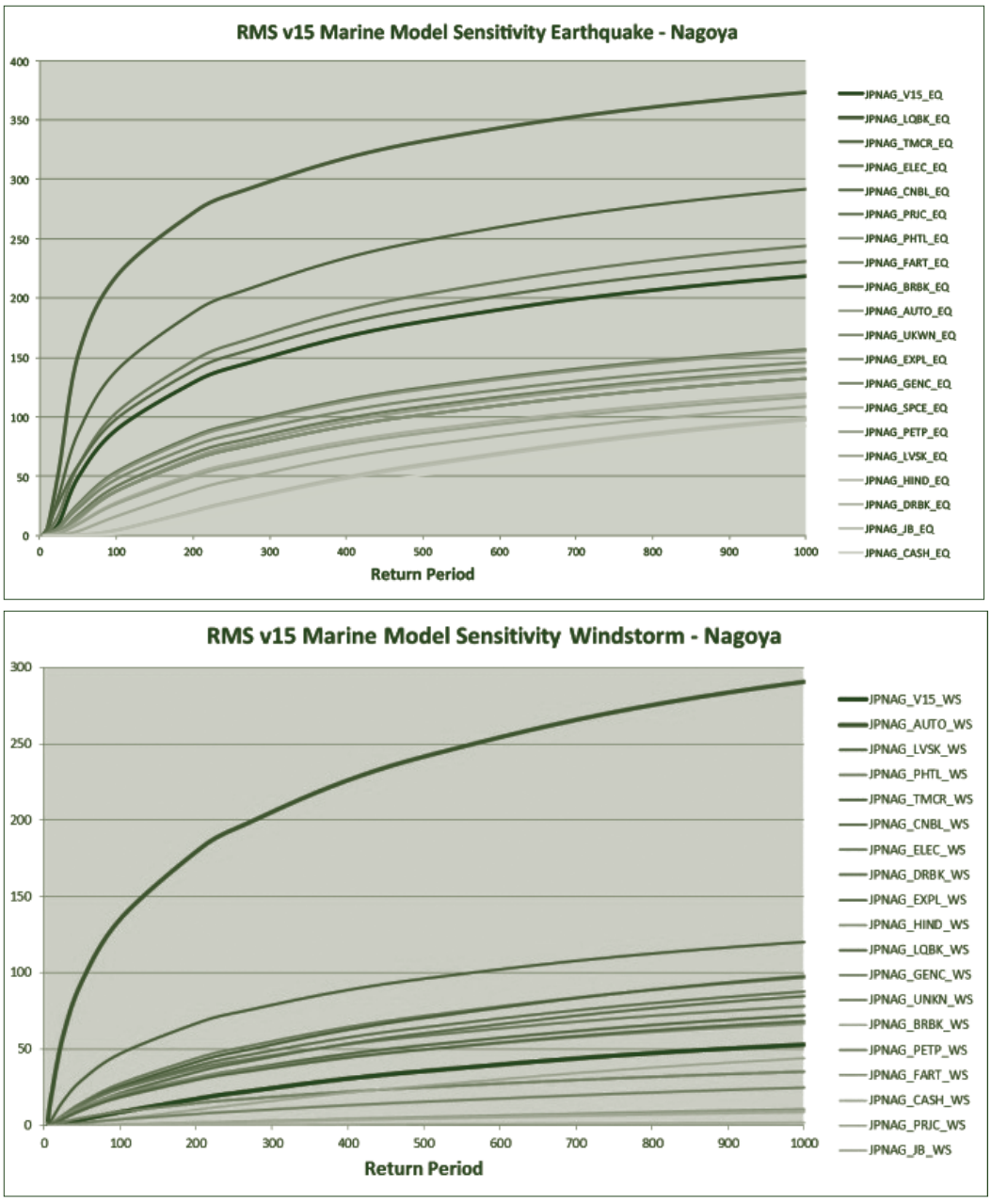
Figure 3 provides a visualisation of exposures captured in the recent Industry Exposure Database ("IED") created by RMS as part of their review of marine exposures in version 16 of their RiskLink model for the Port of Tokyo (part of the 150 global ports captured in the RMS IED).

Figure 3: Port of Tokyo RMS IED Visualised through SpatialKey

Source: RMS, SpatialKey, Willis Re

As part of this review, RMS extended the set of exposures that can be captured within their model with new vulnerability distributions associated with this more granular exposure resolution. Previously, marine cargo exposure was coded as "warehouse contents" with a singular distribution describing the loss potential for this generic exposure. Analysts would then assess the validity of the figures produced against actual loss experience and scale accordingly. The impact of the more extensive set of exposures can be seen in the Willis Re model sensitivity analysis of nominal exposure levels for each exposure code available in the updated RMS model (Figure 4 below). The previous generic coding is illustrated in the exhibit by the thick black line, compared to the other exposure types available in the model, as illustrated by the other curved lines.

Figure 4: RMS RiskLink v16 Additional Exposure Vulnerability

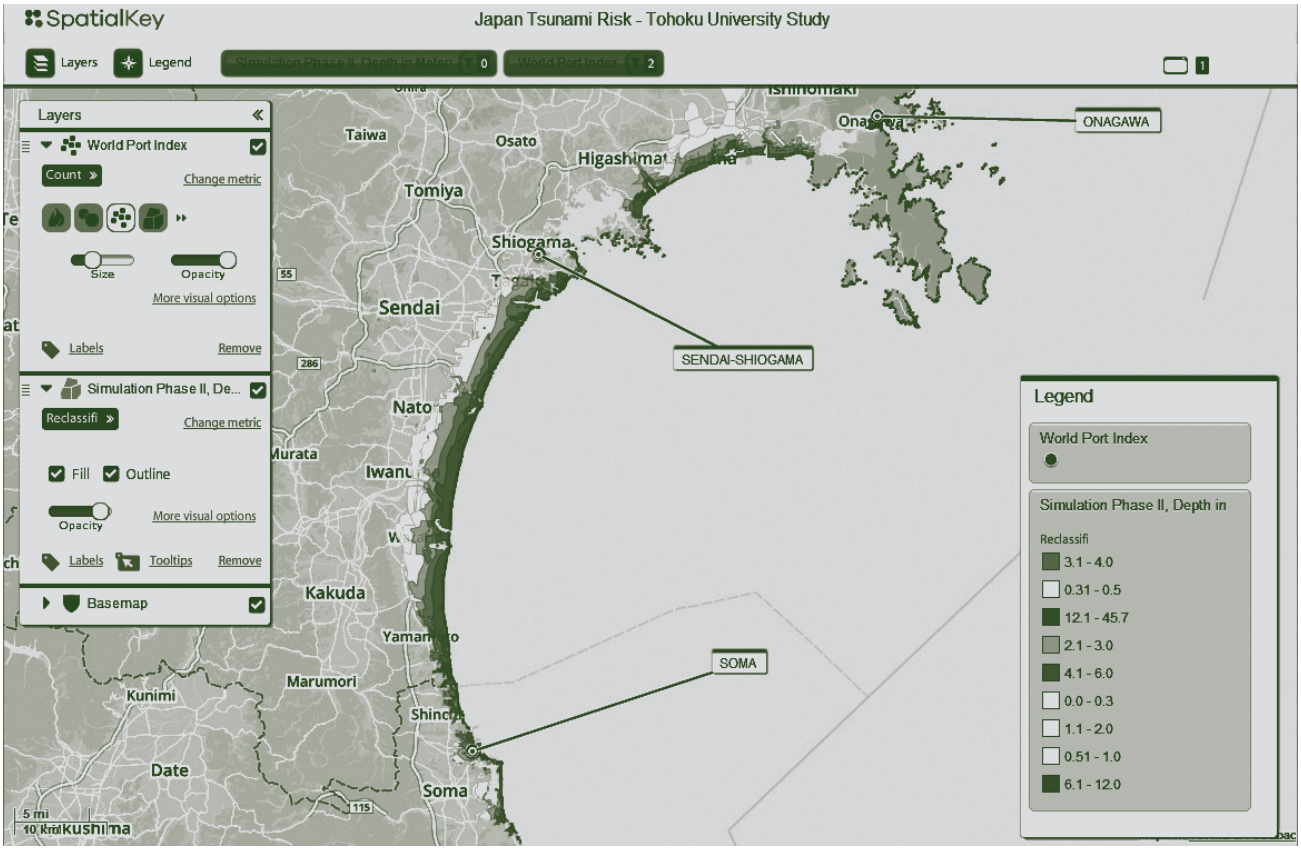


Source: RMS, Willis Re Model Sensitivity Analysis (Port of Nagoya)

The underlying peril model itself has not changed; merely different exposures and associated damage functions have been incorporated within it, meaning that the potential gaps previously present in the model's event set — such as the storm surge associated with a windstorm in Japan — still remain. However, this represents a positive step forward. It should be noted that AIR established marine-specific exposure for their Japanese models in 2008.

Similarly, the peril coverage captured within the vendor models is supplemented by academic studies such as the tsunami risk assessment, which was a collaborative effort between Tohoku University and the Willis Research Network conducted in 2013.

Figure 5: Japan Tsunami Risk Visualised through SpatialKey



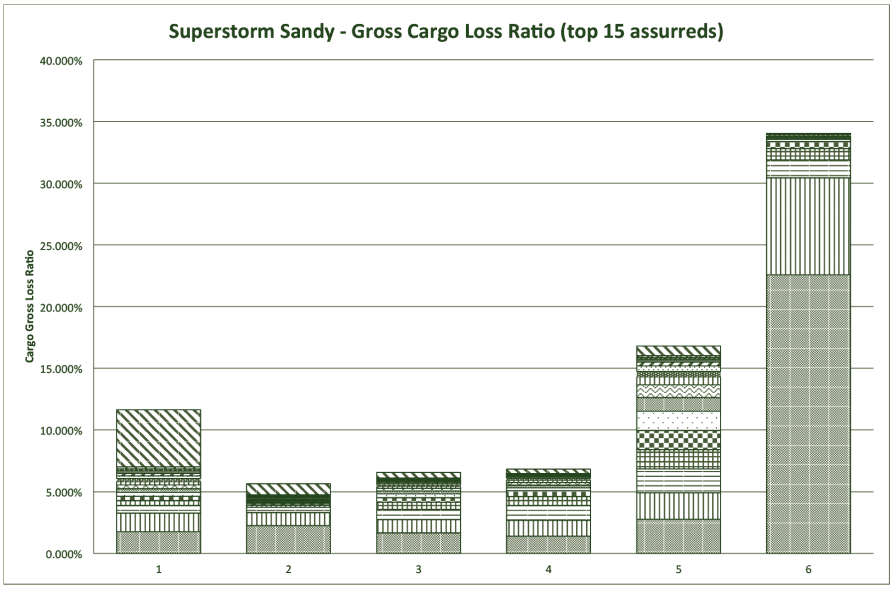
Source: Tohoku University, Willlis Research Network, SpatialKey

The fact remains, however, that the quantification of the level of risk still relies heavily on the calibre of the exposure information captured. Storage locations, with insured limits and capacity utilisation estimates, only tell a portion of the story. Transient exposures (those awaiting trans-shipment or removal by road or rail) represent a challenging element that is difficult to tie down when considering exposure in or around a port facility. Historical loss records with splits between losses from exposure in known storage and those from incidental build-up will provide a better view of the miss factor we see in modelled catastrophe losses. However, obtaining this information has proved challenging when trying to back-test historical events against modelled results, given the relative infrequency of events and the global reach of an insured risk.

Following Superstorm Sandy, Willis Re canvassed 6 large multinational marine insurance companies to assess how their cargo event loss split down into the underlying risk losses. Whilst this did not explicitly answer the question of transient exposure vs static, it did provide useful insight into how an event loss is driven by large individual risk losses. In Figure 6 below each bar represents the gross loss ratio (% cargo premium income) of the top 15 risk losses (with the top bar representing the aggregate loss from the remaining risks outside the top 15).

On average approximately 80% of the event loss for each company was produced by 8 individual risks, which further highlights the potential for large marine insurance companies to experience mixed fortunes in large market events.

Figure 6: Superstorm Sandy – Individual Risk Loss



Source: Willis Re Superstorm Sandy Cargo Loss Ratio for 6 insurance companies

It is interesting to note that the ILS market has also turned its attention to marine and energy exposure, with PCS Global Marine and Energy™ a new non-elemental industry insured loss index. In addition to those non-elemental event losses stemming from hull and cargo insured risk, this index encompasses both Protection and Indemnity and Offshore Energy classes of business, which have not been addressed explicitly in this report.

Looking ahead, as more and more information becomes digital in nature, applications that can trawl through the mass of data — picking out the pertinent pieces, sanitising, standardising, and storing this information as it goes — will inevitably improve our understanding of transient exposures. Technological advancement means that not only how data is captured is changing but also the "who" and "what" is changing too. The Internet of Things and Smart Ships have the potential to revolutionise what data can be accessed, to better assess risk. Whilst they are not necessarily in place today, they are certainly on the horizon.

4. Japan's Earthquake Risk and Countermeasures

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1. Introduction

Many earthquake disasters have occurred in Japan in recent years, including the Tohoku Earthquake off the Pacific coast (The 2011 Great East Japan Earthquake), which left both damage and lessons to be learned. Today, many regions are engaged in disaster prevention and mitigation activities as a result of these disasters. This paper will explain recent earthquake damage and countermeasures in Japan. It will also cover the current state of earthquake risk in Japan and damage expected from future major earthquakes.

2. Earthquake Damage and Countermeasures in Japan in Recent Years

Japan is earthquake prone. About 10% of earthquakes worldwide each year occur in or near Japan. While only large earthquakes cause significant damage, the recent frequency of these larger earthquakes seems to be every few years, and they have thus brought about major changes to Japanese society.

The Southern Hyogo Prefecture Earthquake (Great Hanshin-Awaji Earthquake) that occurred in Kobe in 1995 was the first to bring about such major changes. Early in the morning of January 15, 1995, a magnitude 7.3 (M7.3) earthquake occurred within the Rokko-Awaji fault zone. The full extent of the damage was not immediately apparent because the earthquake struck while the area was still in darkness, and the earthquake observation network and seismic intensity bulletin were not as well developed as they are today. The rising sun revealed the seriousness of the damage, stunning the country as buildings, expressways and other structures had collapsed and fires raged throughout the city. The fault that caused the earthquake ran through the center of Kobe City. Consequently, massive damage occurred because the strong ground motion hit the area in which many people and assets were concentrated. This was the first earthquake disaster to strike a big city in modern-day Japan. Unlike the well-recognized risks of an earthquake in the Tokai region or under metropolitan Tokyo, a major earthquake occurring in a large city in the Kinki region was not considered a concern. This earthquake disaster dramatically changed the way Japan thinks about disaster prevention, with outcomes that have included the revision and enforcement of various disaster prevention laws. Complete disaster prevention is not possible, but Japan has embraced a mindset of disaster mitigation that can reduce the magnitude of damage. Japan now recognizes that earthquake disasters can occur anywhere in the country, and is promoting countermeasures. The government has established a network of seismic intensity meters throughout the country. In the event of an earthquake, these meters immediately identify the areas where large tremors have occurred and where relief activities need to be carried out. Other multiple measures include the establishment of the Headquarters for Earthquake Research Promotion within the government through collaboration between several ministries to conduct strategic earthquake research for disaster prevention and mitigation. These measures are the cornerstone of current earthquake disaster prevention and mitigation strategies.

Subsequent to the Great Hanshin-Awaji Earthquake, several medium-scale earthquake disasters occurred, including the Tokachi-oki Earthquake in 2003, the Niigata Chuetsu Earthquake in 2004 and the Niigata Chuetsu-oki Earthquake in

2007. However, earthquake countermeasures introduced after 1995 proved effective in containing the damage, and restoration and reconstruction was swift. Japan felt that it was fully employing the lessons of the 1995 Great Hanshin-Awaji Earthquake and was making good progress in countering potential major earthquakes in the future.

Then came the Great East Japan Earthquake off the Pacific coast on March 11, 2011 at 2:46 pm. M7-class earthquakes with their hypocenter off the coast of Miyagi Prefecture had been occurring about every 40 years. Numerous countermeasures against the likelihood of such earthquakes were therefore already being implemented in areas near the hypocenter. However, the M9 earthquake that actually occurred far exceeded expectations. This exceptionally powerful earthquake heavily jolted the Tohoku and Kanto regions, causing extensive damage and creating a tsunami with a maximum height over 20 meters that reached the Pacific coast. Extensive liquefaction occurred in the Tokyo Bay area, causing houses to sink and tilt and other damage. The tsunami, which exceeded the design assumption of the nuclear power plant on the coast of Fukushima, caused a nuclear accident. This earthquake certainly demonstrated to Japan that its assumptions and countermeasures left much to be desired.

A committee was subsequently set up in the Cabinet Office to utilize the lessons learned from the earthquake, and to restructure overall disaster prevention policy based on the recognition that assumptions to date were insufficient. Damage estimates and countermeasures for large earthquakes in the vicinity of the Nankai Trough and Sagami Trough are being reviewed again, and local governments are also taking measures against earthquakes that may occur in their regions.

3. The Recent Rise in Earthquake Risk in Japan

How do the people of Japan feel about earthquake risk over the past few years? Many may believe that Japan is at higher risk of earthquake disasters than before. And all wonder, whether abstractly or informed by data from the Japanese government, where the next major earthquake disaster like the Great East Japan Earthquake of 2011 or the Kumamoto Earthquake of 2016 will strike. I will therefore explain from three perspectives why Japanese society believes that earthquake risk is rising year by year.

(1) Earthquakes Seem Increasingly Imminent

Japan is now concerned about a number of potential earthquake disasters, none more so than a major earthquake in or near the Nankai Trough or the Sagami Trough. The Kumamoto Earthquake of 2016 has also heightened awareness of the risk of earthquakes occurring on active inland faults, similar to the earthquake that occurred directly beneath Kobe in 1995. Before explaining this type of earthquake, I will discuss the plates surrounding Japan that cause earthquakes.

The surface of the Earth is covered by about a dozen plates, and four of them surround Japan (Figure 1). Northeastern Japan is on the North American Plate and southwestern Japan is on the Eurasian Plate. The Pacific Plate and the Philippine Sea Plate are subducted beneath these continental plates. The Japan Trench is located on

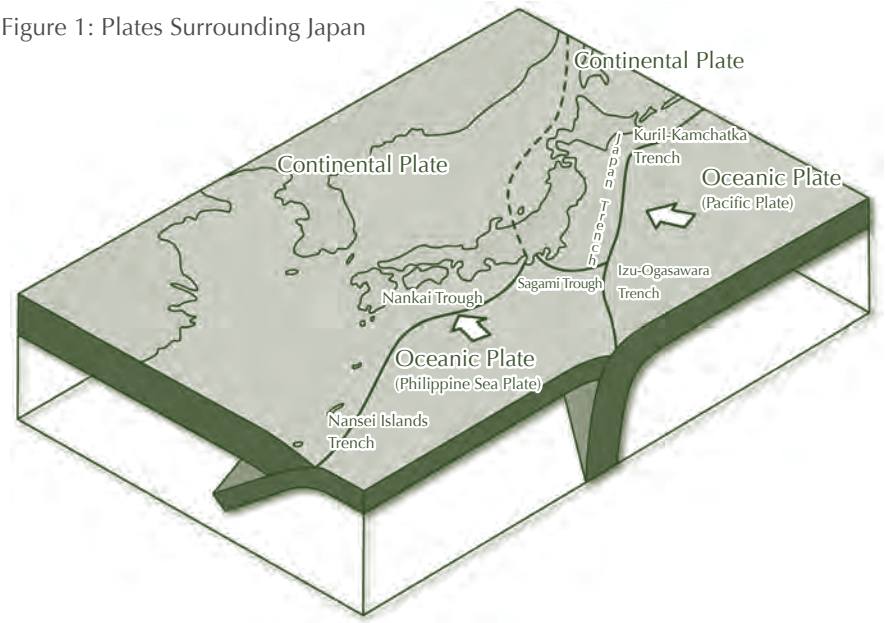
the Pacific coast of northeast Japan where the Pacific Plate is subducted. The Pacific Plate moves toward the west at a rate of about 8 cm per year. The motion of this plate causes earthquake phenomena when the strain that builds on this plate is released. Many earthquakes occur in the area around the Japan Trench, and the hypocenter of the Great East Japan Earthquake of 2011 was along this trench.

In the southwestern part of the Japanese archipelago, the Philippine Sea Plate moves at a rate of 3 to 4 cm per year from south to north, and is subducted beneath the continental plate. This subduction area is called a trough because it is not as deep as a trench. The subduction zone of the Philippine Sea Plate in the vicinity of the Kanto region is called the Sagami Trough, and the subduction zone along the Pacific coast areas including the Tokai, Chubu, and Shikoku regions is called the Nankai Trough.

The subducted plate to the Sagami Trough is situated under the Kanto Plain; that is, directly below Japan's capital, Tokyo. This area of Japan experiences frequent earthquakes, with M8 class earthquakes occurring at intervals of about 200 to 300 years. The last such earthquake was the Great Kanto Earthquake in 1923. Only about 100 years have elapsed since that earthquake, so at this point the probability of an M8 class earthquake is low. Historically, however, M7 class earthquakes frequently occur about 100 years before an M8 class earthquake. For example, the 1855 Ansei Edo Earthquake with a magnitude of about 7.0 occurred about 70 years before the Great Kanto Earthquake. The government's Headquarters for Earthquake Research Promotion estimates the probability that a similar M7 earthquake will occur within 30 years at about 70%. This earthquake would occur directly beneath Tokyo, one of the world's leading metropolises, and therefore would most likely cause major damage. The unsettling prospect is that such damage would paralyze the politics and economy of Japan and significantly influence the global economy.

At the same time, the Sagami Trough leads southward to the Nankai Trough. M8 class earthquakes occur in the vicinity of the Nankai Trough at intervals of about 100 to 150 years. The last such earthquakes were the M7.9 Tonankai Earthquake in 1944 and the M8.0 Nankai Earthquake in 1946. About 70 years have elapsed since those earthquakes occurred, so at this point the occurrence of the next M8 class earthquake is increasingly likely. Furthermore, one school of thought is that the next earthquake will occur at a shortened average interval of about 90 years because the last earthquake did not release all the strain accumulated at the plate boundary. The government's Headquarters for Earthquake Research Promotion therefore estimates the probability of a major earthquake in the vicinity of the Nankai Trough within the next 30 years at around 70%. Such an earthquake, which would also feature strong ground motion waves and tsunami in widespread areas of western Japan, is considered to pose the greatest threat to the country because the likelihood of such an earthquake is high and the damage would be enormous.

Figure 1: Plates Surrounding Japan



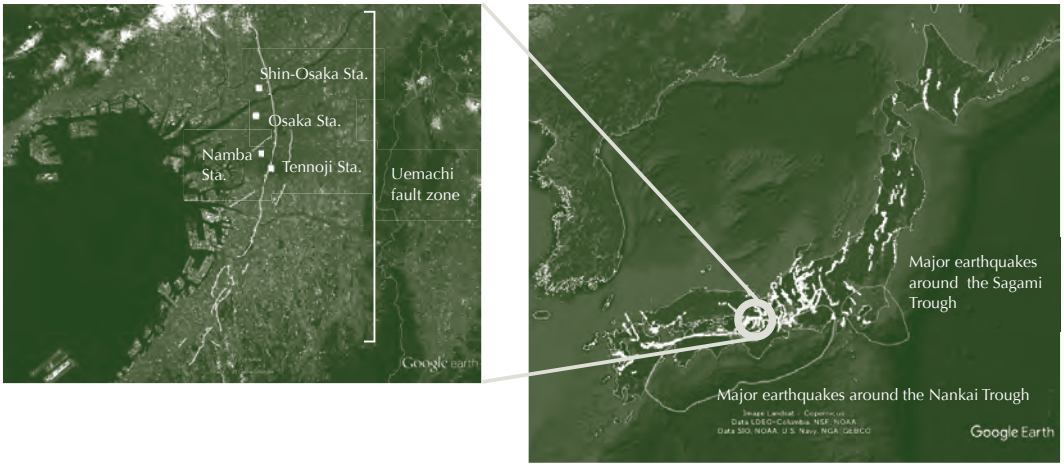
Active inland faults also pose risks. The inland parts of the Japanese archipelago have about 2,000 active faults. Major earthquakes occur on these active faults at intervals of several thousand to tens of thousands of years, so the probability of an earthquake would seem small compared to the probability of earthquakes in the trenches and troughs discussed above. However, the number of active inland faults is so great that a large earthquake occurs on one of these faults somewhere in Japan every few years. The Uemachi fault zone is considered the most dangerous of these active inland faults. The Uemachi fault zone is about 42 km long and traverses the Osaka plain from north to south. An earthquake with a maximum magnitude of 7.5 may occur on this fault zone. Metropolitan Osaka would likely suffer catastrophic damage if such an earthquake occurred. The probability of an earthquake occurring on the Uemachi fault zone within the next 30 years is 2% to 3%, and the fault is among the group of active faults in Japan with the greatest likelihood of an earthquake.

The likelihood that these earthquakes will occur increases with time because the strain on the plates that cause them similarly increases. This is one of the reasons for increased earthquake risk in recent years.

(2) Urbanization Increases Vulnerability

People increasingly congregate in modern cities because of their convenience. Buildings are therefore increasingly taller to accommodate the constantly growing population. Floors in taller buildings generally shake more. While the Building Standards Law of Japan prescribes seismic design to ensure adequate aseismic performance, even if they don't collapse, the occupants of tall buildings are subject to increased risk of injury from falling ceiling panels, furniture, fixtures and the like. Elevators also stop if an earthquake occurs, which means evacuation to the first floor would take a long time. The higher the living environment, the more vulnerable it is to an earthquake.

Figure 2: Uemachi Fault Zone



Major cities with a large population also rely on well-developed transportation networks. Tokyo is representative, as dozens of railway lines serve millions of people in a complicated network above and below ground that operates with a frequency measured in minutes. This network is very efficient under normal circumstances, but an earthquake would cause damage and bring it to an extended halt. This would paralyze traffic, strand people and lead to much congestion. Many businesspeople have long commutes from their homes to central Tokyo, and people would not be able to return home through the congestion if an earthquake occurred on a weekday during working hours. This is also a serious issue to be solved.

Electricity is absolutely essential to keep large cities running. Life support functions in urban areas such as computers, communication equipment, electric lights, trains, traffic lights, and elevators are paralyzed when electricity stops. The time and effort required to restore these amenities increases with the level of urban density.

Population and important infrastructure are increasingly concentrated in Japan's cities, which continue to expand. This situation probably makes society more vulnerable to earthquakes, and the ensuing damage and disruption.

(3) New Knowledge

The government established the Headquarters for Earthquake Research Promotion after the Great Hanshin-Awaji Earthquake in 1995. It researches earthquakes to enhance earthquake disaster prevention measures and earthquake damage mitigation, and it has released various research results. Examples of its research include evaluating the probability of earthquakes in the vicinity of the trough and trench zones and along active inland faults, and the scale and likelihood of damage should an earthquake occur. The headquarters also predicts tremors in the event of an earthquake. Furthermore, the headquarters has evaluated the probabilistic seismic hazard map that indicates the probability of an earthquake with a seismic intensity of 6 or higher occurring in the next 30 years. These surveys and studies have increased knowledge of earthquake risk.

Since 2011, the Central Disaster Management Council of the Cabinet Office has reviewed the evaluations of earthquakes occurring around the Nankai Trough based on the lessons of the Great East Japan Earthquake. Previously, the Council had estimated the largest possible earthquake to be of a magnitude of 8.6 by referencing the 1707 earthquake that occurred in the vicinity of the Nankai Trough area. However, the maximum possible earthquake was revised to be magnitude 9.1 after all possibilities regardless of the maximum magnitude of past earthquakes were examined.

Various government, university and other research institutes are currently involved in earthquake surveys and research. This suggests that new discoveries will emerge that draw on recent lessons from earthquakes including the Kumamoto Earthquake of 2016. This new knowledge will likely continue to heighten people's perception that earthquake risk is increasing.

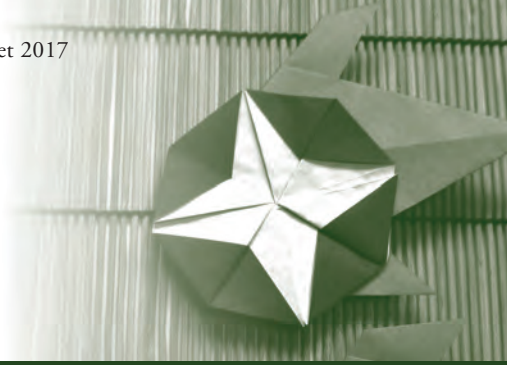
4. Damage from a Large Earthquake Projected in the Near Future

Earthquakes around the Sagami Trough, the Nankai Trough, and the Uemachi fault zone were explained earlier. Such earthquakes would likely cause major damage to the three major metropolitan areas of Japan: the Tokyo metropolitan area, the Chukyo area around Nagoya, and the Kinki area around Osaka. More than 65 million people, or over half the population of Japan, live in these three metropolitan areas. A large earthquake would directly damage buildings and injure people, and would also immeasurably damage Japan's politics and economy. Moreover, it would affect the entire world.

The Central Disaster Management Council of the Cabinet Office is estimating the damage that would result from a variety of earthquakes and formulating countermeasures. The Council has significantly revised predictions about such earthquakes based on the lessons from the Great East Japan Earthquake of 2011. At this point, I would like to compare damage projections for earthquakes around the Sagami Trough, the Nankai Trough, and the Uemachi fault zone.

Table 1 outlines projected direct and indirect damage from earthquakes in these three areas. Data for the Nankai Trough and the Uemachi fault zone assume the largest possible earthquake. Data for the Sagami Trough assume an M7-class earthquake because of the high probability that such an earthquake will occur. The table also presents data for the Great Hanshin-Awaji Earthquake of 1995 and the Great East Japan Earthquake of 2011 for comparison.

A Nankai Trough earthquake is projected to cause the most damage. The strong ground motion and tsunami caused by this earthquake are projected to bring major damage all along the Pacific coast west of the Kanto region, from Kanto itself and the Chubu region to the Kinki, Chugoku and Kyushu areas. A Nankai Trough earthquake would likely damage about 18 times more buildings and cause about 20 times more deaths compared to the Great East Japan Earthquake of 2011, the strong ground motion and tsunami of which caused damage all along the Pacific coast east of the Kanto region. Support for restoration and reconstruction might not be fully available because many regions of western Japan would be damaged at the same



time. In addition, the tsunami may well disrupt transportation by damaging the high-speed railways and expressways connecting the cities of Japan along the Pacific coast and flooding some airports. A particular concern is that large tremors and tsunami would cause massive damage in the Chukyo area, which is Japan's industrial heartland. The impact on Japan's economy would be enormous because damage could equal as much as 40% of the nation's GDP.

An M7-class earthquake around the Sagami Trough would occur directly beneath the Tokyo metropolitan area. While the magnitude of this hypothetical earthquake would be less than the Great East Japan Earthquake of 2011, the damage would be massive because it would occur in the most prosperous urban area, containing a large percentage of Japan's population. This earthquake would likely damage about 5 times more buildings and cause about 1.5 times more deaths compared to the Great East Japan Earthquake of 2011. The institutions that are central to Japan's politics, administration and economy are concentrated in the Tokyo metropolitan area, so an earthquake that impairs their functions would likely negatively impact people's lives and economic activity throughout Japan. Many buildings would collapse, fires would rage, and the road transportation network would be paralyzed. The earthquake would create a vast number of evacuees and victims, who would overwhelm the insufficient number of evacuation centers in all areas. Shortages of food, fuel and other supplies would result from the disruption to distribution in the afflicted areas. Moreover, damage to thermal power plants in the vicinity of Tokyo Bay would destabilize the supply of electricity. Presumably, the flow of information would also be disrupted immediately after the earthquake and into some point in the future. Restoration and reconstruction after damaging earthquakes has typically involved the construction of temporary housing in open spaces, but the lack of such space in urban areas would present an array of difficulties. While damage from this earthquake would be more localized than damage from an earthquake located in the Nankai Trough, it would have a serious and negative impact on Japan.

Also, the earthquake risk of the Uemachi fault zone should not be forgotten. The probability of an earthquake there is lower than for the other areas, but would devastate Osaka if it occurred. Unlike an earthquake in the vicinity of the Sagami Trough, the tremors at the hypocenter would be severe because this earthquake would be due to an active fault just below an urban area. Building damage and human casualties are therefore projected to be greater than from an earthquake in the vicinity of the Sagami Trough.

Japan's three major metropolitan areas are thus exposed to the risk of major earthquakes. Various countermeasures are a priority in the relevant regions.

5. Conclusion

Japan learned much from the damaging earthquakes that have occurred in recent years, and has implemented additional countermeasures to mitigate the damage from the next earthquake disaster and speed restoration and reconstruction. Major earthquakes are thought likely in the near future in the vicinity of the Sagami Trough and the Nankai Trough, which is also an issue of concern for the global economy, requiring preparation for these disasters on a global scale.

Table 1: Comparison of Damage from Future Large Earthquakes and from Recent Earthquakes

		M7 Class Earthquake around the Sagami Trough	Large Earthquake around the Nankai Trough	Earthquake in the Uemachi Fault Zone	Southern Hyogo Prefecture Earthquake (Great Hanshin-Awaji Earthquake)	Tohoku Earthquake (Great East Japan Earthquake)
Date and Time of Occurrence		–	–	–	1995/1/17, 5:46	2011/3/11, 14:46
Hypocenter		Southern part of central Tokyo	–	–	Awajicho, Hyogo Prefecture	Offshore Sanriku (70 km east of Sendai)
Magnitude		M7.3	M9.1	M7.6	M7.3	M9.0
Maximum Seismic Intensity (Projected or Actual)		Seismic intensity 7	Seismic intensity 7	Seismic intensity 7	Seismic intensity 7 (Kobe, Ashiya, Nishinomiya, Takarazuka, Hokudancho, Ichinomiyacho, Tsunacho)	Seismic intensity 7 (Kurihara, Miyagi Prefecture)
Tsunami		–	Tsunami with maximum height over 30 m	–	Minor	More than 9.3 m (Soma Harbor) Maximum run-up of 40.1 m (Ryori Bay)
Buildings Damaged	Totally Destroyed + Burned Down + Washed Away	Maximum 610,000 buildings	Maximum 2,390,000 buildings	About 970,000 buildings	About 100,000 buildings	About 130,000 buildings
Casualties	Dead	Maximum 23,000 people	Maximum 323,000 people	Maximum 42,000 people	6,434 people	15,896 people
	Injured	Maximum 123,000 people	Maximum 623,000 people	Maximum 220,000 people	43,792 people	6,125 people
Main Areas Damaged		Kanto region (Tokyo area)	From the Kanto region to the Pacific Coast of the Kyushu region (especially the Chukyo area)	Kinki region (Osaka area)	Kinki region	Iwate, Miyagi, Fukushima and Ibaraki prefectures
Economic Damage		Approximately 110 trillion yen (physical and indirect damage)	Up to 214 trillion yen (physical and indirect damage)	Approximately 74 trillion yen (physical and indirect damage)	Approximately 10 trillion yen (only physical damage)	Approximately 16.9 trillion yen (only physical damage)
Main Features		Urban disaster that would degrade Japan's core political, economic and other functions	Disaster affecting a broad area	Urban disaster	Urban disaster	Caused the accident at the Fukushima Nuclear Power Station

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

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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. The Bank of Japan and several think tanks estimate that Japan's real growth rate in fiscal 2017 will be around 1%, and expect the Japanese economy to recover gradually in the short term.

At the same time, Japan is confronting the medium-term issue of a declining birthrate and aging society. The Cabinet Office estimates that if the fertility rate remains unchanged, the population will drop by about a third from its current level to 86.74 million in 2060, which will lead to a decrease in productivity due to the decline in the working population. As a result, the Japanese economy is expected to face negative growth from fiscal 2040.

The rapidly decreasing population and the migration of mainly young people from regional areas to the Greater Tokyo area are causing serious concerns about the possibility of a downward economic spiral. The Japanese government is therefore promoting "Regional Revitalization" to ensure the sustainable and steady growth of the Japanese economy, and is implementing focused initiatives with the long-term goal of overcoming population decline and ensuring Japan's ability to grow.

The non-life insurance market is concerned that the automobile insurance market, which accounts for about half of the net premium income of Japanese direct insurance companies, may decrease due to factors including the trend of young people turning away from driving and technological advances such as autonomous driving.

On the other hand, the advance of autonomous driving technologies is broadening the need for product liability insurance. The industry also needs to respond with non-life insurance products that address new risks, including the spread of sophisticated equipment such as drones.

Japan's non-life insurance companies are developing markets by providing new products and services based on changes in customer needs in the mature domestic non-life insurance market.

2. Overview of the Non-Life Insurance Industry

(1) Trends in Business Results of Non-Life Insurance Companies for Fiscal 2016

Fiscal 2016 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 decreased to 8,243.9 billion yen, down 115.8 billion yen from the previous fiscal year. This decrease was a reaction to the previous fiscal year's exceptional demand surge following revision of the long-term fire insurance product in October 2015.

In addition, net claims paid (paid basis) increased by 198.7 billion yen to 4,767.5 billion yen. This was due to the payment by the Kumamoto Earthquake. As a result, the loss ratio for fiscal 2016 worsened by 3.5 percentage points to 63.4%.

Expenses decreased by 31.3 billion yen to 2,650.2 billion yen year on year. Net expense ratio was unchanged at 32.1%.

Underwriting profit (earned/incurred basis) increased by 225.5 billion yen to 340.2 billion yen due to factors including the reversal of the contingency reserve.

On the other hand, interest and dividend income decreased 104.1 billion yen to 512.7 billion yen because of factors including lower dividends from subsidiaries.

As a result, ordinary profits, calculated as the sum of underwriting profit and investment profit, increased 48.4 billion yen to 843.1 billion yen. After deducting tax expense, net income increased 45.5 billion yen to 615.5 billion yen.

On a group basis, all of the top three non-life insurance groups achieved record net income due to factors including the impact of the acquisition of overseas subsidiaries.

(2) 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) for the five largest companies in fiscal 2016 decreased to 15%, compared with 21% for all non-life companies in the industry for fiscal 1995, prior to liberalization.

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

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

With respect to Sompo Holdings, Sompo Japan Insurance Inc. and NIPPONKOA Insurance Co., Ltd., were merged into Sompo Japan Nipponkoa Insurance Inc. in September 2014.

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 addition to the above, AIG Japan Holdings announced the merger of 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. The completion date of the merger is set for January 1, 2018, but consolidated operations began under a pre-merger structure from April 1, 2017.

(3) Response to the Kumamoto Earthquake

Two large-scale earthquakes struck Kumamoto Prefecture on April 14 and 16, 2016, with the second earthquake having a magnitude exceeding 7.0.

Damage extended from Kumamoto Prefecture into Oita Prefecture, across the center of the Kyushu region. The Cabinet Office reported that 161 people died and

8,369 buildings were destroyed. Estimated insured loss for the non-life business ranged from 500 to 600 billion yen.

Japan's earthquake insurance system is a public-private partnership that has the goal of "helping to contribute to the stability of the lives of disaster victims of an earthquake." Non-life insurance companies have strengthened the claims service system by dispatching personnel to handle payments immediately following an earthquake and have also simplified payment procedures. Those initiatives enabled them to pay claims promptly, and have done much to aid victims.

3. Recent Non-Life Insurance Industry Trends

(1) New Product Development

Japan's non-life insurance companies are developing new products aligned with social changes as outlined below.

(a) Automobile Insurance

i) Telematics Automobile Insurance

In recent years, telematics automobile insurance with premiums that reflect analysis of driver behavior and measurement of actual driving distance has attracted much attention in Europe and the United States. In Japan, an increasing number of insurance companies are offering telematics automobile insurance. This market is projected to develop fully because more insurance companies are expected to follow this trend and offer telematics products in the future. Technological advances are likely in the telematics automobile insurance market. Non-life insurance companies are researching emerging technologies and investigating a proactive shift to more sophisticated accident response services and other offerings such as accident reduction services.

ii) Autonomous Driving Technologies

Autonomous driving technologies are now gaining traction, and are expected to develop further toward completely autonomous driving. Non-life insurance companies are therefore paying close attention to the evolving environment surrounding automobile insurance and developing insurance products aligned with the relevant societal changes to help achieve automotive safety and security.

(b) Bicycle Insurance

In recent years, Japan's society is increasingly concerned about traffic accidents involving bicyclists, due to the rising number of such accidents and the greater number of cases in which bicyclists are responsible for larger amounts of compensation.

However, recognition of bicycle insurance and penetration rates are still low. These circumstances have led the non-life insurance industry to publicize the need for bicycle insurance for cyclists and to increase penetration rates.

(c) Inbound Travel Insurance

More foreign tourists have been coming to Japan recently, which has increased the need for support during their visit. Japan's non-life insurance companies have therefore become key providers of travel insurance that gives tourists visiting Japan enhanced security and safety. This type of insurance enables tourists to purchase insurance after entering Japan in languages including English, Chinese and Korean via smartphone and the Internet, and provides services such as multilingual interpreting and cashless payment at medical facilities.

(d) Cyber Insurance

The number of malicious cyberattacks has been increasing worldwide year after year, so cybersecurity measures have become an urgent issue for organizations ranging from large companies and administrative agencies to small and medium-sized enterprises.

In response, Japan's major non-life insurance companies have become core providers of cyber insurance while also expanding support services including consulting to support cyber security, such as services that facilitate the simplified simulation of estimated damages from cyberattacks and drills against targeted e-mail cyberattacks for companies considering the purchase of cyber insurance.

(2) Innovation

The term "fintech," which has recently become common, 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.

The collection of big data and its application in marketing and pricing is no longer novel for insurance companies, who utilize statistical data. Moreover, some non-life insurance companies are accelerating their operations by using AI for the complex tasks involved in assessing claims payment and for customer service functions such as call centers. Moreover, in the near future, it is expected that insurance sales and primary decisions about underwriting will be carried out by AI. Insurance companies are also applying blockchain (distributed ledger) technology to insurance policies. As a result, in addition to accelerated procedures, breakthroughs are expected in enhanced security, the distribution of insurance policies with related information attached, and trade operations in areas such as broadly distributed overseas cargo policies.

(3) Regional Revitalization

The Japanese government is promoting regional revitalization with the long-term vision of overcoming population decline and ensuring Japan's ability to grow. The government has therefore created a comprehensive regional revitalization strategy encompassing regional towns, residents and job creation.

Major companies in the non-life insurance industry are leading initiatives to support regional revitalization. These initiatives are not simply for the sake of corporate responsibility; they are also designed to create the need for insurance by

helping clients to expand their businesses. In recent years, major non-life insurance companies have been central to cooperative regional revitalization agreements with local governments. The major purposes of the agreements are to promote industry and disaster response. Close cooperation with communities to address regional revitalization issues has the objectives of creating new insurance needs and growing along with local communities.

(4) Earthquake Insurance

The Japanese earthquake insurance system celebrated its 50th anniversary in 2016, and penetration rates have increased steadily since 1966 when the system started. The Great East Japan Earthquake in 2011 and the Kumamoto Earthquake in 2016 reaffirmed the risk of earthquakes in Japan and the importance of the earthquake insurance system, and have also been instrumental in the rise in the earthquake insurance penetration rate over the past several years. The non-life insurance industry has further promoted understanding of earthquake insurance through public relations using media including television, commercial messages and posters and by holding various events at which people can gain experience of artificial earthquakes using simulation machines.

In December 2014, a probabilistic earthquake prediction map was released that reflected the occurrence of the Great East Japan Earthquake, and the hypocenter model was revised. Following the review of the hypocenter model, damage categories and base rates were revised in January 2017. As shown below, damage categories increased to four from the previous three, which enables claims payment that is better aligned with actual damage. In addition, base rates will increase in three stages, which will raise the national average premium by about 5.1%. The timing and details of further revision of the insurance premium rate are currently undetermined.

Table 1: Segmentalization of Degree of Loss Associated with the Revision of the Earthquake Insurance System in January 2017

Degree of Loss	Before Revision	After Revision
Total loss	100% of amount insured	100% of amount insured
Half loss	50% of amount insured	60% of amount insured (Large half loss)
		30% of amount insured (Small half loss)
Partial loss	5% of amount insured	5% of amount insured

Source: Compiled from materials available on the website of the General Insurance Association of Japan

(5) Expanding Overseas Business

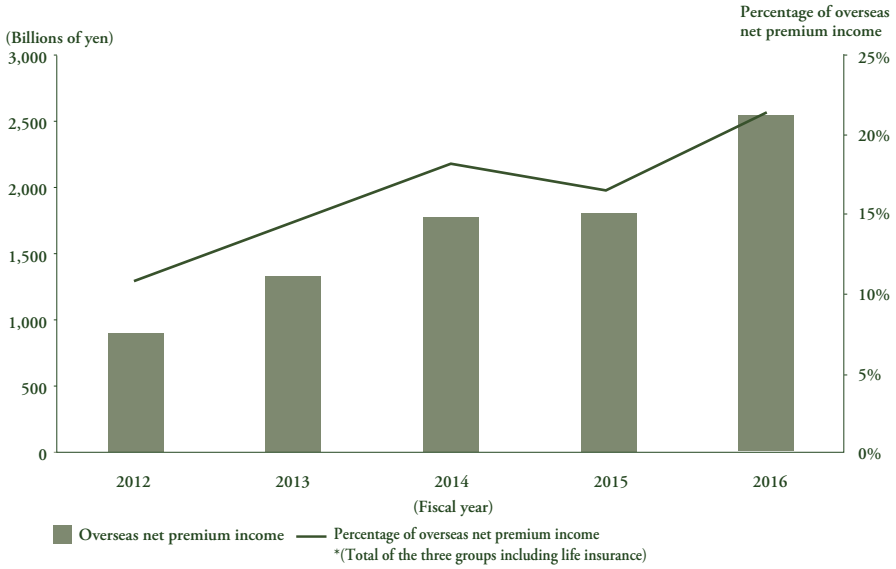
The top three non-life insurance groups have all positioned overseas business as a growth driver, and have aggressively implemented initiatives such as forming business alliances with local insurance companies and engaging in M&A.

Figure 1 shows overseas net premium income for the top three non-life insurance groups. Over the past several years, overseas net premium income[1] for these insurance groups has been trending upward, and fiscal 2016 overseas net premium income was about three times that of fiscal 2012. In fiscal 2016, overseas business accounted for approximately 20% of premium income for the top three

non-life insurance groups due to the inclusion of newly consolidated subsidiaries, which will be discussed shortly.

Note: 1. 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 acquired the general insurance operations in Asia of U.K. company Aviva plc in 2004, and used it as its base for advancing into the ASEAN region. Moreover, in February 2016 MS&AD Group completed its acquisition of Amlin plc of the United Kingdom, thus strengthening its reinsurance business.

Sompo Holdings acquired leading U.K. specialty (re)insurer Canopius Group Limited in May 2014. In addition, it significantly expanded its overseas insurance business by completing the acquisition of Endurance Specialty Holdings Ltd., which focuses on primary insurance and reinsurance in the United States.

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 improve capital efficiency.

Table 2: Overseas Business Development among Japan's Top Three Non-Life Insurance Groups (2016-2017)

Month/Year	Name of Company	Contents
February 2016	Mitsui Sumitomo Insurance	Completed the acquisition of Amlin
April 2016	Aioi Nissay Dowa Insurance	Established telematics automobile insurance services company in the U.S. Established a U.S. subsidiary to research and investigate advanced automobile technology
August 2016	Mitsui Sumitomo Insurance	Acquired shares of and strengthened the partnership with MAPFRE
March 2017	Sompo Japan Nipponkoa Insurance	Completed the acquisition of Endurance Specialty Holdings
June 2017	Tokio Marine Asia	Increased shareholdings in IFFCO-TOKIO General Insurance

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

(6) Trends in Regulation by Regulatory Agencies

The revised Insurance Core Principles (ICPs) adopted by the International Association of Insurance Supervisors (IAIS) in October 2011 specified the implementation of Own Risk and Solvency Assessment (ORSA) practices. As a result, the introduction of ORSA-related regulations and systems is progressing internationally. In Japan, the Financial Services Agency (FSA) has been conducting enterprise risk management (ERM) hearings with certain insurance companies since 2011. Moreover, from fiscal 2015 all Japanese insurance companies are obligated to submit ORSA reports, which the FSA uses to evaluate the status of ERM, including ORSA. The FSA announced the results of its evaluation of insurance company ERM in September 2016.

Another major FSA initiative involves examining economic value-based evaluation and supervision methods. The FSA prepared 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. FSA says that introducing the economic solvency ratio into the regulatory regime may have 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.

4. Conclusion

Japan's non-life insurance market is maturing due to factors including the declining birthrate and the aging population. However, non-life insurance companies are targeting sustainable growth by providing products and services made possible by technological development, identifying customer needs through means including the creation of new businesses and regional revitalization, and further expanding their overseas business.

6. Trends in Japan's Life Insurance Industry

Life Underwriting & Planning Department
The Toa Reinsurance Company, Limited

1. Overview of Economic and Social Trends

Investment Strategy under the Negative Interest Rate Environment and Revision of the Standard Valuation Interest Rate

The negative interest rate policy introduced by the Bank of Japan on January 29, 2016 has affected life insurance companies in Japan.

Lower market interest rates have led a number of life insurance companies to stop selling single-premium insurance products, a typical life insurance savings vehicle. This lower interest rate also caused the standard valuation interest rate, a rate used to calculate the standard policy reserve, to move downward in April 2017. Under these circumstances, some life insurance companies have been revising their assumed interest rate, a rate for calculating insurance premiums. However, a number of life insurance companies are keeping their assumed interest rate revisions within a tighter range than standard valuation interest rate revisions, and limiting premium increases in many cases.

The protracted low-interest rate environment has also brought out critical asset management concerns among life insurance companies. Now a larger proportion of the higher-yield government bonds in their accounts is gradually reaching maturity, and the proportion of lower-yield bonds is growing. Therefore, life insurance companies are about to face the possibility of negative spreads, which means that the assumed interest exceeds the coupon and dividend income earned by life insurers, and therefore they are reviewing their asset management strategies. Domestic bonds have traditionally been the largest component of the investment portfolios of life insurance companies. With the negative interest rate policy precluding the prospect of higher interest rates, life insurance companies have been reducing their domestic bond portfolio and increasing their foreign bond portfolio. In particular, U.S., Canadian and Australian government bonds over 10 years with yields of around 1% to 2% have been attractive for asset management. At the same time, the more foreign bonds they invest in, the more foreign exchange risk they inevitably take, which has raised concerns about the major shift to foreign bonds from domestic bonds given the global competition to devalue currencies. Under these circumstances, some companies have diversified their portfolios by deploying capital in growth fields such as environment-related and infrastructure businesses.

With the negative interest rate policy expected to continue, attention has now turned to how life insurance companies will adapt.

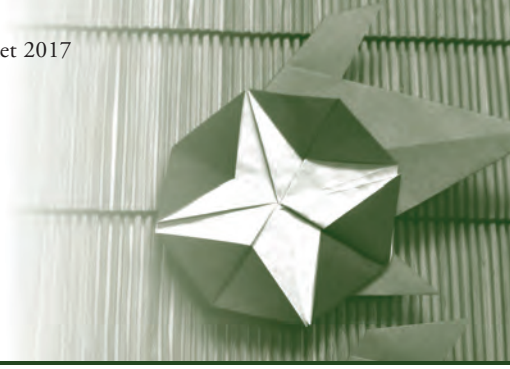
2. Overview of Bunisiness Results for Fiscal 2016

The fiscal 2016 business results for 41 life insurance companies are as follows:

(1) Total Amount of New Business

During the fiscal year ended March 31, 2016 (fiscal 2015), the total insured amount of new business increased for individual life insurance due to the popularity of products denominated in foreign currencies, but the total insured amount of new business decreased for individual annuity insurance because of the deterioration of the asset management environment due to negative interest rates.

During the fiscal year ended March 31, 2017 (fiscal 2016), however, the total insured amount of new business decreased by 1.2% to 68.5 trillion yen for individual



life because several companies stopped selling single-premium whole life insurance as the asset management environment deteriorated. The total insured amount of new business increased by 32.9% to 11.1 trillion yen for individual annuity insurance because of the popularity of these products as a substitute for single-premium whole life insurance.

(2) Total Amount of In-force Business

The total insured amount of in-force business for individual life increased by 0.5% compared with the previous fiscal year to 862.9 trillion yen, despite the decrease in the total insured amount of new business. For individual annuity insurance, the amount increased by 4.1% to a record high of 107.9 trillion yen due to the increase in the total insured amount of new business.

(3) Premium Revenues and Total Assets

Total premium revenues decreased by 9.7% compared with the previous fiscal year to 35.2 trillion yen due to the decrease in sales of single-premium insurance. Total assets increased 2.3% to 375.5 trillion yen due to the increase in foreign securities.

3. Trends in the Life Insurance Industry

More Efficient Underwriting and Claims Assessment through the Use of Artificial Intelligence

Underwriting and claims assessment significantly burden the employees of life insurance companies, who must determine whether claims are true or false and make decisions that are subject to their own discretion. Life insurance companies have therefore been introducing artificial intelligence (AI) to automate underwriting and claims assessment with the goals of raising employee's administration efficiency, improving quality and enhancing customer service.

Many life insurance companies are introducing or considering AI for underwriting and claims assessment because it can reduce the time required to make decisions, which should lead to reduced administrative and educational costs. In addition, it can improve underwriting quality by employing the experience and knowledge embedded in AI.

In a specific example, on March 21, 2017 Japan Post Insurance Co., Ltd. began using IBM Japan, Ltd.'s IBM Watson Explorer AI to support the decisions of underwriters. This is expected to improve the quality of customer service in assessing claims and raise operating efficiency. Japan Post Insurance's claims assessment operations use Watson to help underwriters resolve uncertainties with a high level of confidence by providing referential evidence that draws on the more than 5 million outcomes of past cases. Underwriters can therefore make assessment decisions based on the content presented by Watson, so even relatively inexperienced personnel can make claims decisions more accurately and promptly.

Life insurance companies are currently using AI in limited ways, such as to perform certain regular operations using AI, supported by checking by human employees. However, AI is likely to take over more significant operations in the future. In fact, some companies have announced plans to reduce personnel in claims divisions.

The spread of AI is expected to raise operating efficiency and improve quality. At the same time, AI's potential economic impacts are also gathering attention because they can have negative effects on the employment environment as people lose their jobs.

Disclosure of Bancassurance Commissions

The savings-type products that are sold through bancassurance, such as foreign currency-denominated insurance and variable insurance, are increasingly popular because their rates of yield are high, helping individuals manage their assets. They are also a key source of commission income for banks amid the deteriorating asset management environment in Japan resulting from the Bank of Japan's negative interest rate policy.

Foreign currency-denominated insurance and variable insurance account for the majority of bancassurance sales and are generally purchased as investments. These products are therefore similar to investment trusts, which banks also sell. However, banks must disclose their investment trust commissions, but not their bancassurance commissions. This has been seen as a problem because bancassurance commissions are not transparent, and banks are likely to push the bancassurance products with higher commissions.

Under these circumstances, in October 2016 several major banks began disclosing the commissions they receive from insurance companies in exchange for the sale of life insurance savings-type products, and such practice is also spreading among regional banks. Disclosure of commissions increases the information available to customers, helping them choose insurance products and improving insurance product transparency. Disclosure of commissions is also expected to reduce commissions by stimulating competition.

In terms of "fiduciary duty", the start of disclosure of bancassurance commissions is expected to encourage greater transparency in the structure of financial products and the methods used to sell them.

4. Product Trends

More Insurance with Wellness Benefits

In recent years, the life insurance industry has been developing insurance products that reward policyholders with benefits for being healthy, so-called "wellness benefits," which reflect the state of a policyholder's health in premiums.

Conventionally, life insurance companies determined premiums using criteria such as age. However, the development of information technology (IT) has enabled companies to acquire health data from individuals using smartphones and wearable terminals, and determine the state of their health by analyzing the data collected. Analysis of that data clarifies its causal relationship with morbidity rates, allowing companies to set premiums based on the state of policyholder's health. In fact, The Neo First Life Insurance Company, Limited of the Dai-Ichi Life Group is collaborating with Japan Medical Data Center Co., Ltd. to sell health insurance that reflects healthy life expectancy.

Other products that encourage wellness using premium discounts as an incentive are also under development. In July 2016, Sumitomo Life Insurance Company, SoftBank Group Corp. and South African financial services company Discovery Limited set up a partnership to launch Discovery's wellness program, Vitality, in the Japanese market as Japan Vitality Project. Vitality is a program that prompts policyholders to be healthier by providing related knowledge and incentives. The three players plan to create a database to collect health-related information via wearable devices provided by SoftBank, which will help Sumitomo Life develop insurance products for which premiums decrease when policyholders lead healthier lives.

These cases exemplify the increasingly active development of insurance products using personal data acquired through the latest IT.

The development of such products that offer the incentive of reduced insurance premiums should make healthy people more aware of the importance of good health, but it also raises concerns that more people will not be able to get insurance.

Companies have traditionally set health insurance premiums using groups based on factors such as age and gender. If companies sell products with premiums that vary depending on an individual's state of health, healthy people will be able to obtain insurance more easily but higher-risk individuals will have difficulty in obtaining and maintaining insurance because of higher premiums.

Wellness products are likely to increase in conjunction with advances in IT. At the same time, companies must concurrently create mechanisms that enable higher-risk individuals to obtain insurance easily.

5. Regulatory Trends

Revision of the Standard Mortality Table

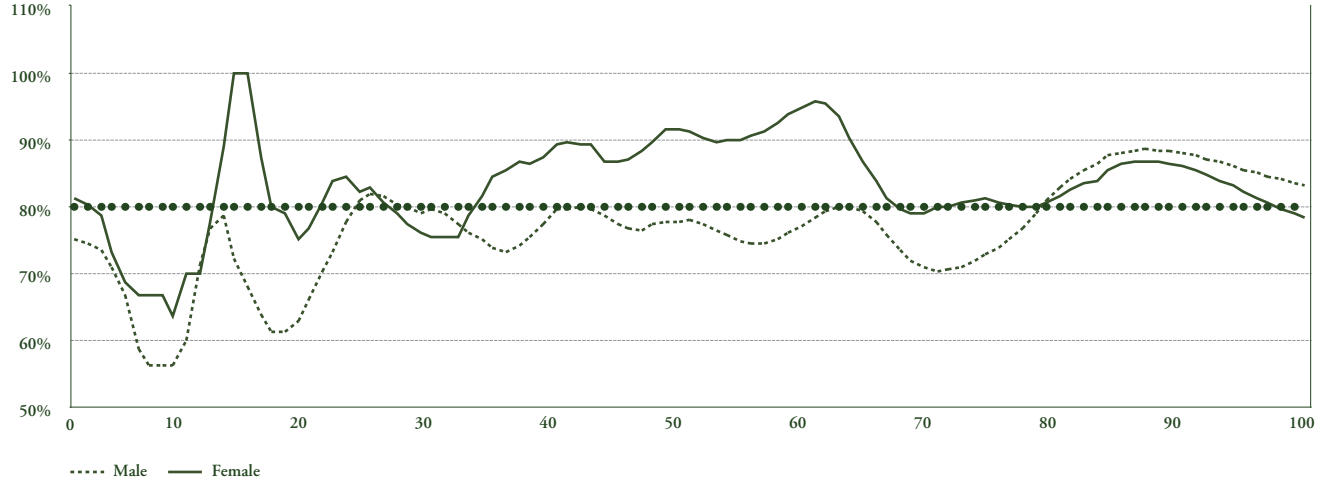
On March 31, 2017, the Institute of Actuaries of Japan proposed a revision of the standard mortality table for application after fiscal 2018. The Insurance Business Act prescribes the standard mortality table as a fundamental component in calculating the standard policy reserve. This revision will be the first in 11 years since the revision in 2007.

The revision reflects the improvement from 2007 in the insurers' experienced mortality rate and the national mortality rate. The mortality table is based on experiential data from the three observed years of 2008, 2009 and 2011; 2010 was excluded because of the significant effect of the Great East Japan Earthquake. The previous table used experiential data from the three observed years of 1999 to 2001. The average life expectancy as at age zero (0) has risen to 80.77 years from 78.24 years for males and to 86.56 years from 84.94 years for females. In addition, the limiting age (ω) of the mortality table for death benefit products increased to 109 years from 107 years for males and to 113 years from 110 years for females because of the mortality improvement.

The recent revision 1) revised the 2007 mortality table for death benefit products and health insurance benefit products; but 2) continued to use the same mortality table revised in 2007 for annuity products. The Financial Services Agency of Japan deemed continued use of the 2007 standard mortality table for annuity products appropriate because it still ensured soundness.

Life insurance companies are projected to reflect the revisions in their life and health insurance premium rates for products sold from fiscal 2018. Premiums for death benefit products are projected to decrease about 5% to 10% for 10-year term insurance policies as a reflection of the increased longevity. On the other hand, premiums for certain health insurance products may rise because of the increased longevity. An issue of interest will be how life insurance companies incorporate the two factors: the previous revision of the standard valuation interest rate in fiscal 2017 and the latest revision of the standard mortality table in fiscal 2018, into their product design.

Figure: The Ratio of the 2018 Standard Mortality Table to the 2007 Standard Mortality Table



Note: A discount of approximately 20% is projected when the 2007 standard mortality table is indexed at 100, although the draft revision of the 2018 standard mortality table varies according to gender and age.

Supplemental Data: Results of Japanese Major Non-Life Insurance Companies for Fiscal 2016, Ended March 31, 2017 (Non-Consolidated Basis)

(Unit: Millions of yen, %)

		MS&AD Holdings		Tokio Marine Holdings		Sompo Holdings	Fuji	Toa Re
		Mitsui Sumitomo	Aioi Nissay Dowa	Tokio Marine & Nichido	Nisshin	Sompo Japan Nipponkoa		
Net Premiums Written	**Fiscal 2016**	**1,469,699**	**1,200,525**	**2,116,121**	**140,118**	**2,165,694**	**233,655**	**174,970**
	Fiscal 2015	1,507,420	1,192,089	2,128,312	138,671	2,218,425	279,178	173,632
Net Claims Paid	**Fiscal 2016**	**811,476**	**648,618**	**1,179,147**	**72,937**	**1,242,843**	**134,983**	**129,569**
	Fiscal 2015	800,899	644,889	1,175,089	75,731	1,287,493	137,498	122,580
Underwriting Profit (Loss)	**Fiscal 2016**	**81,799**	**39,531**	**116,131**	**8,121**	**112,474**	**(19,027)**	**3,770**
	Fiscal 2015	19,116	24,881	13,886	7,875	78,284	(12,991)	(8,246)
Ordinary Profit (Loss)	**Fiscal 2016**	**215,542**	**75,188**	**312,436**	**9,019**	**230,474**	**(18,414)**	**13,115**
	Fiscal 2015	167,896	61,771	377,258	9,715	178,086	(7,845)	3,275
Net Profit (Loss) for the Year	**Fiscal 2016**	**164,568**	**50,391**	**248,632**	**6,579**	**164,401**	**(28,473)**	**11,066**
	Fiscal 2015	113,970	31,098	301,610	6,147	126,289	(5,446)	2,191
Total Assets	**Fiscal 2016**	**6,777,076**	**3,498,264**	**9,524,466**	**417,919**	**7,568,779**	**824,308**	**507,469**
	Fiscal 2015	6,786,590	3,418,516	9,242,545	421,690	7,036,222	849,964	491,993
Ratio 1 Loss Ratio (%)	**Fiscal 2016**	**61.2**	**59.1**	**60.7**	**59.0**	**63.2**	**64.2**	**74.1**
	Fiscal 2015	58.9	59.2	60.0	61.6	63.7	55.4	70.6
Ratio 2 Expense Ratio (%)	**Fiscal 2016**	**31.2**	**33.5**	**30.8**	**33.1**	**32.0**	**41.3**	**24.9**
	Fiscal 2015	31.0	34.3	30.6	32.7	31.6	42.3	23.7
Ratio 3 Yield on Investments (Income) (%)	**Fiscal 2016**	**2.32**	**2.12**	**2.66**	**1.31**	**2.20**	**1.60**	**3.26**
	Fiscal 2015	2.40	2.28	4.41	1.41	2.13	1.51	4.01
Ratio 4 Solvency Margin Ratio (%)	**Fiscal 2016**	**657.9**	**851.6**	**860.9**	**1,325.5**	**677.0**	**889.7**	**875.3**
	Fiscal 2015	585.9	829.3	746.3	1,127.7	729.3	919.5	792.0

Sources: Each company's financial statements of Fiscal 2016

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VEGETABLE OIL INK

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