



KNOWLEDGE NOTE 6-2

**CLUSTER 6: The economics of disaster risk,
risk management, and risk financing**

Earthquake Risk Insurance



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Earthquake Risk Insurance

The March 2011 earthquake that hit East Japan was the fourth-largest ever recorded. It was not only a human tragedy but an economic shock with losses estimated in excess of ¥16,900 billion, making it the costliest disaster in history. Despite this, the Japanese insurance industry is expected to emerge without significant financial impairment, thanks to a well-developed residential earthquake risk insurance dual program (with private nonlife insurers and cooperative mutual insurers) based on conservative control of insurers' liabilities (through insurance policy structures and reinsurance). Meanwhile, more than half of Japanese homeowners are still uninsured, creating a significant fiscal burden for the government.

FINDINGS

RESIDENTIAL EARTHQUAKE INSURANCE: A DUAL PROGRAM WITH CAREFULLY CONTROLLED LIABILITIES

Residential earthquake insurance coverage in Japan relies on two major actors: nonlife private insurers and cooperative mutual insurers. Despite major differences in their financial management of earthquake risk, these two insurance systems demonstrated their efficiency in claims settlements and their financial viability after the Great East Japan Earthquake (GEJE). Table 1 compares the residential earthquake insurance scheme offered by the private nonlife insurance companies with the scheme offered by the largest cooperative mutual insurer, the National Mutual Insurance Federation of Agricultural Cooperatives (also known as JA Kyosai*). While the perils covered, assets covered, and extent of coverage are similar across the two programs, earthquake coverage is offered on a voluntary basis with risk-based premium rates by private insurers, and on an automatic basis with flat rates by cooperative mutual insurers.

Both programs are based on conservative control of insurers' liabilities. In both programs, the claims payments are not intended to provide complete coverage: the maximum

* Also known as Zenkyoren.

TABLE 1: **The dual residential earthquake insurance system in Japan**

	<i>Private non-life insurers</i>	<i>Cooperative mutual insurer JA Kyosai</i>
Perils covered	Earthquake, volcanic eruption, tsunami	Earthquake, volcanic eruption, tsunami
Assets covered	Residential dwelling and content	Residential dwelling and content
Extent of coverage	30–50 percent of fire insurance amount with limits	Up to 50 percent of fire insurance amount with limits
Coverage purchase	Optional endorsement to residential fire insurance policy	Automatically included in building endowment policy
Premium rate	Risk-based rates (by risk zone and type of construction)	Flat rates (wooden/nonwooden)
Reinsurance	Japan Earthquake Reinsurance Co. (JER) and Japanese government	International reinsurance and capital markets
Loss adjustment	3-step system	Proportional system
Penetration of earthquake coverage (percent households)	25%	11%

coverage is limited at 50 percent of the fire insurance amount (subject to upper limits). Likewise, both programs rely on sophisticated reinsurance strategies. The reinsurance protection of the private insurance scheme relies on a catastrophe insurance pooling mechanism, the Japanese Earthquake Reinsurance Co. (JER), backed by the government of Japan. In contrast, reinsurance protection for cooperative mutual insurers is provided by the international reinsurance and capital markets, with no government intervention. In both cases, the use of reinsurance serves to limit the liability of the private or cooperative risk carriers.

Penetration under the private nonlife insurance program is estimated at about 25 percent of Japanese households, with just under 13 million residential earthquake insurance policies in force: an estimated 48 percent of all fire insurance policies in force include earthquake coverage. Cooperative mutual insurance programs cover about 14 percent of Japanese households, so that total penetration is estimated at 39 percent.[†] JA Kyosai holds a very large share of the cooperative mutual insurer market, with 5.4 million households holding building endowment policies covering residential earthquake risk (11 percent of total Japanese households). The cooperative mutual insurer Zenrosai has an additional 1.7 million

[†] The number of households is estimated at about 51 million (Government of Japan, Statistics Bureau). Policy-in-force data from the Japanese Non-Life Insurance Rating Organization (2010), JA Kyosai Business Operations (2011), and Zenrosai Annual Report (2010). Cooperative mutual insurer figures extrapolated based on 85 percent estimate of the JA Kyosai market share.

natural disaster policies covering residential earthquake risk, accounting for a further 3 percent of total Japanese households.

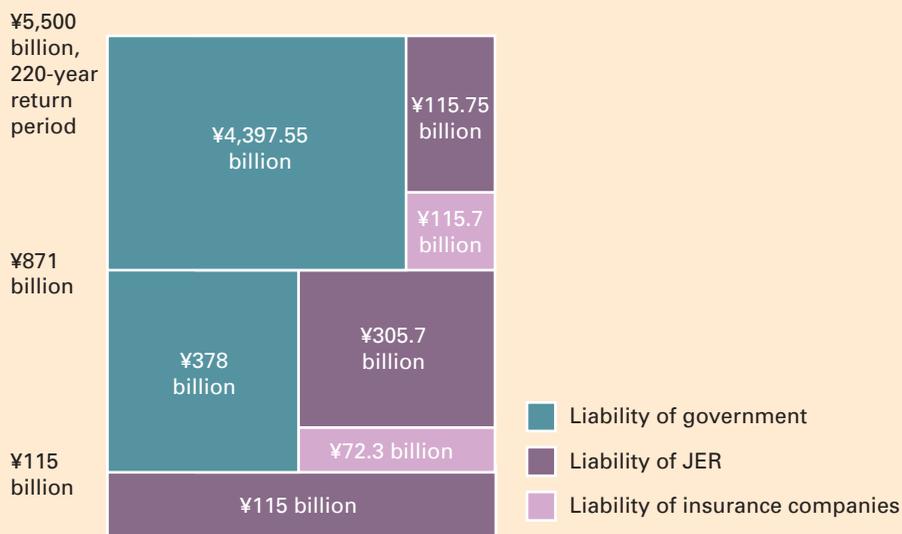
PRIVATE NONLIFE INSURANCE COMPANIES AND THE JAPANESE EARTHQUAKE REINSURANCE COMPANY

Earthquake insurance offered by private nonlife insurance companies is available as an optional endorsement to fire insurance policies. Earthquake coverage is available at policy limits of 30 percent to 50 percent of the fire insurance limit, with maximum limits of ¥50 million per dwelling and ¥10 million for personal property.

A three-step claims settlement allows for rapid damage assessment and claims settlement. Payouts are not proportional to damage, but based on a three-step system: total loss, half loss, and partial loss—which allow for 100 percent, 50 percent, and 5 percent of the earthquake insurance policy limit, respectively.

The premium rates are risk based, and vary according to the prefecture where the dwelling is located (divided into eight risk zones) and type of construction (wooden or nonwooden). For an insured amount of ¥10 million, the annual premium varies between ¥5,000 for a nonwooden structure in Nagazaki Prefecture, and ¥31,300 for a wooden structure in Tokyo. Discount rates of up to 30 percent apply when the building is earthquake resistant, according to the Japanese Housing Performance Designation Standards, including a 10 percent discount for buildings constructed after 1981. The premium rates, calculated by the Non-Life Insurance Rating Organization, consist of the pure premium rate and a loading

FIGURE 1: Japanese earthquake reinsurance program (as of May 2011)



Source: JER 2011a.

factor. It should be noted that the rates do not include any loading for profit since the program is not for profit. Despite this rating and because of Japan's considerable earthquake exposure, rates are still considered high.

The 1966 Earthquake Insurance Law (enacted after the Niigata earthquake of 1964) established the JER, to whom private nonlife insurers were obliged to offer earthquake insurance and cede 100 percent of the earthquake premium and liabilities. The JER thus acts as the sole earthquake reinsurer for the private insurance market. The JER can be seen as an earthquake reinsurance pool, retaining a portion of the liability and ceding the rest back to private insurers (based on their market share) and to the Japanese government through reinsurance treaties. The reinsurance program is designed such that the liability of private insurers and the JER itself does not exceed the accumulated reserves from earthquake insurance premiums. Figure 1 describes the Japanese earthquake reinsurance program as revised in May 2011 after the GEJE. The total claims-paying capacity of the program is currently ¥5,500 billion, which is estimated to correspond to the scenario of the 1923 Great Kanto earthquake with a return period of 220 years.[‡] Should insured earthquake losses exceed this amount, claims would be prorated.

The role of the Japanese government is central to the program. The maximum liability of the government of Japan, JER, and private insurers is 87 percent, 10 percent, and 3 percent, respectively. It should be noted that under the previous reinsurance program (before May 2011), the government's liability was only 78 percent, and the rest was shared equally between the JER and private insurers. The revision of the reinsurance program, leading to an increase of the government's liability share, is the direct consequence of a depletion of the earthquake reserves of both the JER and private insurers after the GEJE.

Japanese accounting standards allow the insurers to build up preevent catastrophe reserves (by accumulating the earthquake insurance premiums received, less expenses and any underwriting gains and investment income) over time with separate resources to pay claims, the size of which is based on the probable maximum loss of the insurer's portfolio. Likewise, the government of Japan has set up a special account to accumulate its reserves. Table 2 shows the amount of reserves at end of fiscal years 2010—that is, before the GEJE. The GEJE wiped out about half of the program's earthquake reserves.

TABLE 2: **Reserves under the earthquake insurance program**

¥ billion	End of fiscal year 2010
Government	1,343
JER	424
Private insurers	489
Total	2,256

Source: JER 2011a.

[‡] The total claims-paying capacity of the program will increase to ¥6.2 billion in 2012 (Ministry of Finance 2012).

It is noteworthy that the total reserves supporting the Japanese Earthquake Reinsurance Program, even before the GEJE, represent only a fraction of the liability of all stakeholders. The size of this potential gap is largely due to the government's reserve-to-liability ratio under the program, which appears low. In case of a major earthquake exceeding the reserves available, it would be critical to immediately mobilize additional resources to ensure the financial solvability of the program.

COOPERATIVE MUTUAL INSURERS

Residential earthquake insurance is also available through cooperative mutual insurers. These insurers conduct insurance operations on behalf of Japan's cooperative societies. The largest of these cooperatives is JA Kyosai, which holds an estimated 85 percent market share of all the homeowners insurance written through cooperative mutual insurers. Like any cooperative, JA Kyosai operates on a nonprofit basis. Its insurance products are different from those of private insurers. Cooperative mutual insurers offer building endowment policies: these policies offer more comprehensive coverage than the policies available through the private insurers and can therefore be seen as a savings mechanism that provides funding for home repairs, whether caused by natural disasters or other adverse events. The five-year (or longer) term policy automatically covers residential dwellings and personal property from damage caused by fire, flood, earthquakes, and other natural disasters. If the policy expires and the policyholder has not claimed a total loss, he or she is entitled to a partial refund of the premium. At the start of 2011, JA Kyosai's client base comprised more than 11 million building endowment policies.

Earthquake insurance is automatically included in the building endowment policies offered by JA Kyosai. The policy limit is 50 percent of the fire insurance limit, up to ¥250 million. The average fire insurance amount is ¥30 million, hence the average earthquake insurance limit is ¥15 million.

Under the building endowment policy available through JA Kyosai, the claims settlement process in case of an earthquake is proportional: a loss assessor estimates the damage percentage of the house, and this rate is applied to the earthquake policy limit.

The premium rate is flat, that is, the same wherever the dwelling is located. It only differs according to whether the building is a wooden or nonwooden structure.

Cooperative mutual insurers are not subject to the Earthquake Insurance Law and do not participate in the JER. They work outside the nonlife insurance regulatory framework and are instead accountable to their respective ministries; for example, JA Kyosai reports to the Ministry of Agriculture, Forestry, and Fisheries. In contrast to private nonlife insurers, cooperative mutual insurers cede a significant portion of their liabilities to the international reinsurance market. JA Kyosai is known to have one of the largest reinsurance programs in the world, with reinsurance capacity in excess of ¥75 billion. Its large and well-diversified asset base also allows it to retain a significant portion of its liability. In addition to traditional reinsurance, JA Kyosai has issued catastrophe (Cat) bonds to better spread its risk (see box 1).

BOX 1: Innovative catastrophe risk financing: Capital markets protect Japanese farmers against earthquake

In 2008, Munich Re, a reinsurance company based in Germany, issued JA Kyosai's second catastrophe (Cat) bond, a \$300 million issue, through the special-purpose vehicle, Muteki Ltd.

Cat bonds are index-linked securities that secure financial resources on the capital markets, to be disbursed in case of the occurrence of a predefined natural disaster. Cat bonds generally cover the highest level of risk and are mainly issued for specific perils with an annual probability of occurrence of 2 percent or less (that is, a return period of 50 years or more). Unlike traditional reinsurance, Cat bonds are fully collateralized and offer multiyear coverage (usually 3 to 5 years).

The three-year Muteki Cat bond provided fully collateralized protection for Japanese earthquake exposure indirectly to JA Kyosai/Zenkyoren, through a reinsurance agreement with Munich Re, which served as counterparty on the transaction. Like other Cat bonds in Japan, the Muteki Cat bond was parametric, triggered by the location and magnitude of an earthquake rather than the actual losses. Following the GEJE disaster, the Muteki Cat Bond became the first Cat Bond to pay out on the occurrence of an earthquake event. The instrument released the full coverage limit of \$300 million in response to the event.

In February 2012 Guy Carpenter and Company announced the placement of a \$300 million Cat bond, through the SPV Kibou Ltd, which would ultimately benefit JA Kyosai. It provided protection on a parametric basis, using earthquake data gathered from various recording stations from the Kyoshin-Net network of seismographs.

INDUSTRIAL AND COMMERCIAL EARTHQUAKE INSURANCE

Traditionally, industrial and commercial earthquake insurance has been issued as a reduced indemnity policy, which provides limited coverage on a proportional basis. The extent of the coverage depends on the location of the asset, for which the country has been divided into 12 risk zones. The indemnity limit varies from 15 percent in Tokyo up to 100 percent in Niigata. Following the enactment of the Insurance Business Law in 1996, which largely deregulated the insurance market in Japan, insurance policies on a first-loss basis were also offered, which generated a significant increase in the sum insured (the maximum amount that could be paid out). Loss of revenue and business interruptions caused by earthquakes have not traditionally been marketed and have low penetration rates.

Other classes include earthquake fire expense insurance. This is a limited amount for fire following an earthquake, which is provided automatically with some insurance policies, such as the storekeepers' comprehensive policy. The coverage is limited to 5 percent of the fire sum insured, up to certain fixed limits. Other insurance policies that generally include earthquake coverage are cargo insurance, motor insurance, and engineering insurance.

ECONOMIC AND INSURED LOSSES

The GEJE caused major direct economic losses, with current estimates of ¥16,900 billion (KN 6-1). Private (residential, commercial, and industrial) buildings represented 62 percent, and public infrastructure represented 13 percent of the (direct) economic losses (see annex 1). Insured losses were estimated at ¥2,750 billion, or 16 percent of total economic losses. Residential assets represented 78 percent of insured losses. Fifty-six percent of the residential insured losses were covered by private insurers and the JER, and 44 percent were covered by cooperative mutual insurers (see annex 1).

Despite significant differences, both private and mutual residential earthquake insurance programs had adequate capacity to meet their claims obligations, thanks to efficient management of exposure to losses through a combination of policy limits and reinsurance protection. The earthquake insurance program managed by the private nonlife insurance companies faced an estimated total loss of ¥1,200 billion, with 42 percent retained by private insurers, 13 percent retained by the JER, and 45 percent retained by the government. This event, however, severely depleted the earthquake reserves of both the private insurers and JER, leading to an increase in government liability in the revised reinsurance program of 2012. Earthquake losses incurred by JA Kyosai were estimated at ¥830 billion, 90 percent of which were residential losses. It is estimated that about 58 percent of those losses were reinsured.

The three-step earthquake claims settlement system implemented by the private insurance companies allowed claims to be settled rapidly. Satellite images were also used to identify total losses on buildings, which helped further speed up claims settlements. In the aftermath of the disaster, the General Insurance Association of Japan designated specific total loss zones, based on satellite imagery (KN 5-2). Any total loss claims filed within these areas did not require additional confirmation of incurred losses, thereby speeding up the payout process. Out of ¥1,200 billion generated by the 741,000 claim payments made after the GEJE, 60 percent were paid within two months and 90 percent within five months.

COMPARATIVE ANALYSIS OF THE GEJE WITH OTHER RECENT EARTHQUAKES

It is interesting to compare the economic and fiscal impact of the GEJE with the impact of other recent earthquakes: the 2010 earthquake in Chile and the 2011 earthquakes in Canterbury, New Zealand. All three earthquakes were very large in magnitude and caused severe economic losses in their countries. Table 3 summarizes this comparative analysis. While the GEJE caused the largest economic losses in absolute terms, losses as a percentage of gross domestic products (GDP) are lower than those in Chile and New Zealand given the size of the Japanese economy. The government's portion of direct losses (that is, additional expenditures), expressed as a percentage of total government expenditures, were estimated at 8 percent for the GEJE and 11 percent for the Canterbury earthquake in New Zealand. Finally, the fraction of the insured losses covered by international reinsurance was estimated at 95 percent in Chile, 29 percent in New Zealand (where the Earthquake Commission EQC retained a large fraction of the losses), and 23 percent in Japan. This last figure hides a large difference between the JER, which relies on public reinsurance and cooperative mutual insurers, such as JA Kyosai, that purchase most of their reinsurance capacity abroad.

TABLE 2: **Comparative analysis of the Tohoku (GEJE), Canterbury, and Maule earthquakes**

	<i>Tohoku, Japan</i>	<i>Canterbury, New Zealand</i>	<i>Maule, Chile</i>
Year	2011	2011	2010
Magnitude	9.0	6.3	8.8
Estimate direct economic losses (\$ billion)	225	15	20
Estimated direct economic losses (% GDP)	4	9	9
Estimated direct losses borne by government (as % of government expenditures)	8	11	n/a
Estimated insured losses (% of direct economic losses)	16	80	40
Estimated insured losses covered by international reinsurance	23	73	95

Source: Swiss Re 2011; Ain Benfield 2011; Ministry of Finance Japan 2012; New Zealand Treasury 2011; RMS 2011.

Note: Direct economic losses are defined as damage to physical assets (including infrastructure).

LESSONS

Some key lessons can be drawn from the review of Japan's earthquake insurance programs in the light of the GEJE:

- **No one-size-fits-all.** The dual earthquake insurance programs in Japan illustrate that there is no one-size-fits-all catastrophe insurance program. Two very different schemes can coexist successfully within a country significantly exposed to earthquakes, offering earthquake coverage to about four households out of ten in Japan.
- **Resilience is critical for earthquake insurance programs.** Both programs managed to fulfill their obligations after the GEJE without difficulties, because of the sound management of policy limits and conservative reinsurance coverage. The apparent resilience of the current setup does not mean, however, that there is no room for these schemes to improve without compromising sustainability. For example, the earthquake insurance limit offered by JA Kyosai started at 10 percent and has increased progressively to 50 percent currently.

- **Rapid claims settlement can be achieved, even after a major disaster.** The three-step claims adjustment system implemented by the private insurers allows for rapid damage assessment and claims settlement. It also takes into account that, immediately after a major disaster, large numbers of loss assessors have to be deployed at the same time. The simplicity of the three-step system allows this to happen.
- **Insurance penetration in Japan is high, but there is still considerable room for expansion.** About 40 percent of Japanese households have earthquake insurance coverage, leaving 60 percent of households without coverage. International experience shows that it is very difficult, if not impossible, to increase the penetration rate beyond a certain level on a voluntary basis. Compulsory earthquake insurance could therefore be considered.

The GEJE also highlighted certain challenges of earthquake insurance programs run by private insurance companies:

- **The JER claims-paying capacity is limited in the aggregate.** The aggregate limit is currently set at ¥5,500 billion (to be increased to ¥6,200 billion in 2012), which would be sufficient for a major earthquake such as the Great Kanto earthquake in 1923. But this does not take into account the occurrence of consecutive major earthquakes, which could jeopardize the solvency of the program.
- **The government's liability under the JER exceeds its ex-ante financing arrangements.** The government's maximum liability is adjusted based on the balance of earthquake reserves of the private insurers and the JER and the maximum defined liability under the program. The government currently holds 87 percent of the total liability of the program. Its current special account would not be sufficient to cover this level of liability and would require an immediate budget appropriation or reallocation in case of a major disaster.
- **Limited policy coverage may not meet the needs of the insured.** The program is designed to provide partial coverage (up to 50 percent of the fire insurance coverage limit) to "stabilize the livelihood of the earthquake victims" (article 1 of the 1966 Earthquake Insurance Law). There seems to be a growing demand for higher coverage, but such an increase in coverage should be carefully evaluated to maintain the financial sustainability of the system.
- **The claims settlement process introduces significant basis risk and could be revised.** Although the three-step claims adjustment process allows for rapid settlement of claims, there is a big gap between payouts for partial loss (5 percent) and half loss (50 percent). This increases the risk that payments will not match the needs of the insured party following the occurrence of damage (basis risk). A fourth intermediate step could be introduced to reduce this risk.
- **Catastrophe risk modeling for Japan is sophisticated, but could be improved.** State-of-the-art catastrophe risk models have been developed for Japan, but need to be further refined as secondary loss perils such as tsunamis (which caused about 30 percent of the total losses from the GEJE) and liquefaction are not included

as standard in all models. These models could also be used to further assess the catastrophe risk exposure of public buildings and infrastructures.

RECOMMENDATIONS FOR DEVELOPING COUNTRIES

DEVELOPING VIABLE AND AFFORDABLE CATASTROPHE RISK INSURANCE PROGRAMS

Japanese earthquake insurance programs demonstrated considerable resilience after the GEJE. From this experience, recommendations can be made to disaster-prone developing countries willing to promote catastrophe risk insurance to help them promote viable and affordable programs and clearly define the role of the government in public-private partnerships (PPPs).

Structure policies to allow for sustainable and affordable programs. Catastrophe risk insurance policies should be designed to enable insurance companies control their liabilities and offer affordable coverage. The policy structure can be revised over time to better respond to the needs of the policyholders, while also ensuring the system's resilience to major disasters. The partial coverage produced by both Japanese earthquake insurance programs and the simplified loss adjustment process of the private insurer system help to keep costs down.

Price insurance premiums based on the underlying risks. Insurance premiums should reflect the underlying risks with respect to the various risk zones and types of construction. Risk-based insurance premiums make policyholders aware of the underlying cost of risk, thereby providing financial incentives to engage in disaster risk mitigation. Even in cases where the full cost of cover is not passed onto the policyholder, it is still possible to signal the underlying cost of risk by making subsidies transparent.

Provide incentives to invest in disaster risk mitigation. Additional financial incentives, such as discounts on premium rates or lower deductibles, can be offered to the policyholders who invest in risk reduction.

Consider mechanisms for enforcing insurance purchase. Voluntary catastrophe risk insurance does not typically generate high penetration rates, even in highly developed insurance markets. Some type of compulsory mechanism, such as an automatic catastrophe guarantee in fire insurance policies, may be necessary to ensure that a large proportion of the population is insured against natural disasters.

Promote multiple-catastrophe risk insurance delivery channels. Catastrophe risk insurance should leverage existing nonlife insurance delivery channels, such as private insurers or mutual insurers. The Japanese system demonstrates that different segments of the population may be best served by different delivery channels, even for very similar products. Multiple distribution channels for catastrophe risk insurance should therefore be explored.

Develop detailed catastrophe risk models. Detailed catastrophe risk models and databases are essential for detailed risk assessment, premium rate calculation, and efficient management of catastrophe risk insurance liabilities. In addition to a strong hazard model, such assessments also require detailed exposure databases of at-risk assets (buildings and infrastructure) and detailed vulnerability functions to translate hazard values into dollar losses. These models are typically developed by private risk modeling firms and licensed to the insurance industry. But for some less-developed insurance markets, governments and donors have funded or partially funded the development of such models as public goods to support market development.

Develop catastrophe risk insurance market infrastructure. Catastrophe risk insurance markets require major investments in basic infrastructure, such as catastrophe risk models, exposure databases, product design and pricing, and the like. Governments can play a major role in developing this kind of infrastructure to help the private insurance industry can offer cost-effective and affordable insurance solutions.

Promote enabling legal and regulatory environments. Unlike traditional lines of insurance business such as automobile insurance, catastrophe risk insurance can generate large correlated losses for insurers. The legal and regulatory framework should enforce adequate pricing, reserving, and reinsurance buying to ensure that insurers will meet their claims in full in the event of a disaster.

Promote PPPs for catastrophe insurance programs. Governments can play an important role in building an affordable and sustainable earthquake insurance program. As the private insurance sector brings its technical expertise and financial capacity to the table, governments can support the development of public goods and risk-market infrastructure to foster sustainable market-based insurance solutions.

Governments can play a role as the financier of last resort. Governments may want to act as financiers of last resort when private reinsurance capacity is unavailable or too expensive to allow domestic insurers to offer cost-effective insurance solutions. Governments should not compete with the private reinsurance market but rather complement it. When needed, governments should make financial capacity available to domestic insurers through public reinsurance or (contingent) credit.

BOX 2: Agriculture and fishery insurance

Insurance schemes in agriculture and fishing helped farmers and fishermen stabilize their businesses by compensating them for losses and damages caused by the GEJE. Insurance paid for some level of damage sustained by almost all fishing boats. In Japan, these schemes began as cooperative activities by local farmers and fishermen. They were subsequently turned into voluntary mutual aid programs established by the government, which subsidizes the premiums paid by farmers and fishermen, covers part of the administrative costs, and reinsures the insurance associations.

Policies in force for agricultural, fishing boat, and fisheries insurance in 2009

	<i>Number of households underwritten (thousands)</i>	<i>Area underwritten (thousands of hectares)</i>	<i>Value covered (¥ million)</i>	<i>Penetration</i>
Farm products				
Paddy rice	1,752	1,479	1,223,157	91% (area)
Field rice	0.4	0.2	46	5% (area)
Wheat and barley	49	252	83,277	95% (area)
Fruit trees				
Harvest mutual relief	76	45 (number of boxes)	107,200	26% (number)
Tree mutual relief	4	1	7,000	2% (number)
Livestock	89	6.665 (Number of livestock)	724,585	42% (number)
Field crops	82	259	140,400	62 %
Fishing boats	192 (boats)	n.a.	1,028,517	>100% (number of boats)
Fisheries	61	n.a.	394,155	52% (households)

n.a. = Not applicable.

Fishery insurance

The earthquake and tsunami damaged some 25,000 fishing vessels, at a cost of ¥170 billion. Ninety percent of the vessels in Iwate, Miyagi, and Fukushima prefectures were damaged, which had an enormous effect on the fishing industry since these vessels were used for aquaculture as well as fishing. Before the tsunami, the three prefectures accounted for 10 percent of the total catch in Japan (excluding aquaculture). Aquaculture industries were also severely damaged, particularly in the Iwate and Miyagi prefectures, where production of oysters and wakame seaweed is widespread. Damage to aquaculture amounted to ¥131 billion: 57 billion for production and 74 billion for facilities.

BOX 2 ,CONTINUED

The fisheries insurance system in Japan is well organized, providing essential insurance services at a reasonable cost to all fishermen including small-scale producers. The fishing vessel insurance system, which was established in 1952 under the Fishing Vessel Damage Compensation Law, aims at stabilizing fishing businesses by covering the loss of and damages to their fishing vessels. The system includes the following insurances:

- *Fishing vessel insurance* covering basic damage caused by accidents and disasters, and including special insurance for damage caused by war and seizure.
- *Protection and indemnity insurance* covering compensation for the crew and damages incurred during navigation.
- *Owner-operator insurance* covering the death of owner-operators.
- *Cargo insurance* covering the loss of catches or cargo.
- *Pleasure boat insurance* covering compensation, rescue costs, and damages.
- *Transshipped catches insurance*.
- *Crew salary insurance* covering crew salaries if vessels are seized.

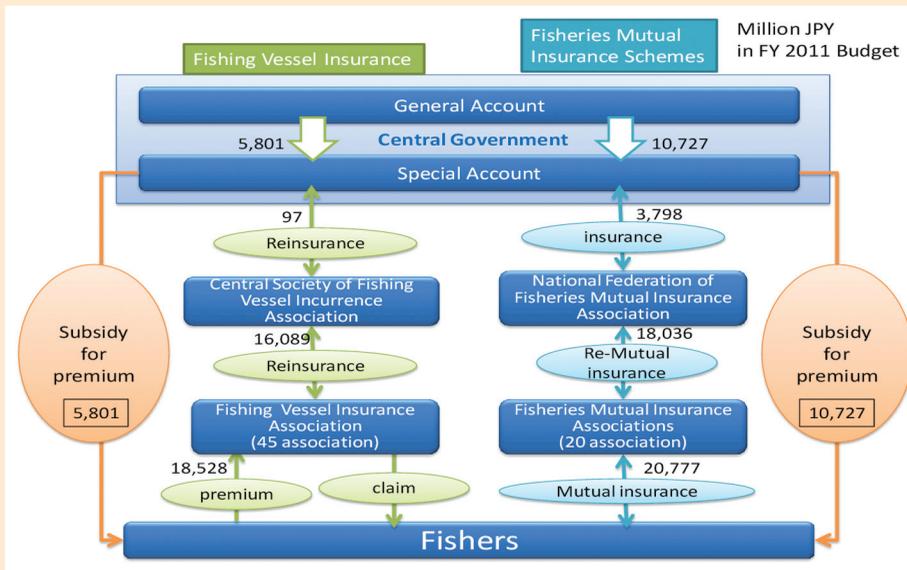
The fisheries mutual insurance scheme, which was established in 1964 under the Fisheries Disaster Compensation Law, aims at stabilizing small- and medium-size fishing and aquaculture operations by covering losses from poor catches caused by natural disasters. The system insures fish harvests, aquaculture, special aquaculture, and fishing gear.

The government subsidizes one-third to one-half of the premium. While fishing vessel insurance enjoyed a surplus of ¥16.5 billion in 2010, the Fisheries Mutual Insurance Scheme suffered a deficit of ¥28.9 billion.

	<i>Fishing vessel insurance system</i>	<i>Fisheries mutual insurance scheme</i>	<i>Total</i>
Government	72.7 (78%)	21.3 (77%)	94.0 (78%)
Reserve of government special account	11.0 (12%)	—	11.0 (9%)
Associations at national level	1.4 (2%)	3.0 (11%)	4.4 (4%)
Associations	7.8 (8%)	3.2 (12%)	11.0 (9%)
Total	92.9 (100%)	27.5 (100%)	120.4 (100%)

BOX 2 ,CONTINUED

The Ministry of Agriculture, Fishery, and Forests estimates that total claims would amount to ¥120.4 billion, of which the central government will cover ¥94 billion, or 78 percent for the GEJE. As of March 13, 2012, ¥63.4 billion in claims have been paid out: ¥47.5 billion under the fishing vessel insurance system, and ¥15.9 billion under the fisheries mutual insurance scheme. Sixty percent of vessels were insured under the vessel insurance scheme, of which some 80 percent of boats were over 20 tons. Some 80 percent of the insured vessels were more than 15 years old. Since the schemes cover the residual value of the vessels, the claims paid out may not cover the replacement costs.



Agriculture insurance

Damage to agricultural production and facilities from the GEJE event amounted to ¥63 billion. Rice is an important crop in Japan, but because the GEJE happened before the rice-growing season, insurance almost did not cover rice production losses. Since compensation related to the accident at the Fukushima Nuclear Power Plant has not yet been decided, the total payout on agricultural insurance is uncertain. In Miyagi Prefecture, the agricultural insurance scheme has covered damages to greenhouses in the amount of ¥1billion.

The Farm Losses Compensation Law introduced the agricultural insurance scheme in 1947 to help farmers stabilize their businesses by covering damages caused by natural disasters; the scheme offers insurance coverage for almost all major agricultural products. It was started by local farmers as a cooperative initiative to set up a reserve fund

BOX 2 ,CONTINUED

to pay for insurance premiums, which evolved into agricultural mutual relief associations. The insurance scheme includes: rice, wheat, and barley insurance (mandatory for paddy fields of more than 20 hectares); livestock insurance; fruit and fruit tree insurance; field crop and horticultural insurance; greenhouse insurance; and houses and properties. The government subsidizes half of farmers' premiums.

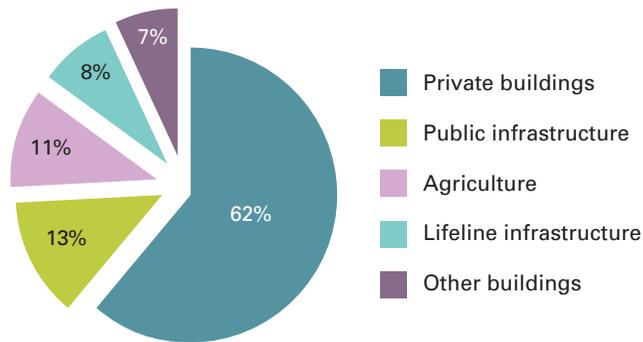
Prepared by Mikio Ishiwatari, World Bank.

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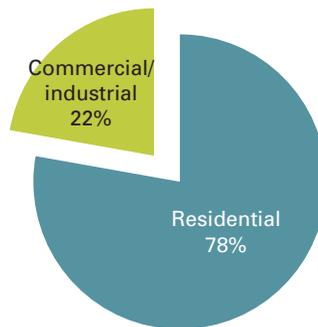
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ANNEX 1. ECONOMIC AND INSURED LOSSES OF THE GREAT EAST JAPAN EARTHQUAKE (GEJE)

GEJE: Economic losses by sector, as percent of total loss (¥16,900 billion)



GEJE: Insured losses by sector, as percent of total insured losses (¥2,750 billion)

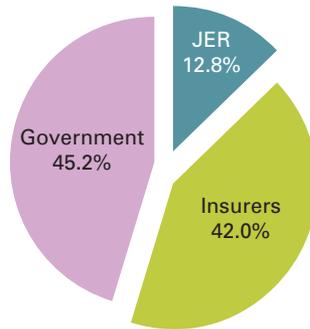


GEJE: Insured residential losses by scheme, as percent of total insured residential losses (¥2,137 billion)



ANNEX 2. ESTIMATED GEJE INSURED RESIDENTIAL LOSSES, BY EARTHQUAKE INSURANCE PROGRAM

GEJE: JER earthquake insurance claims (¥1,200 billion)



GEJE: JA Kyosai earthquake insurance claims (¥830 billion)

