

# Chapter 2

## Japan's Disaster Risk Financing: Framework and Policies



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**Abstract** Throughout its history, Japan has faced various types of natural disasters, including the Great East Japan Earthquake in 2011. Against this backdrop, the country has developed a wide range of country-specific disaster risk financing (DRF) tools, and encouraged developing countries to follow suit. This chapter is the first attempt to capture the key characteristics of Japan's own DRF tools and the cross-border DRF policies for development purposes. Specifically, Japan's earthquake insurance, established in 1966, provides a means of burden-sharing between the public and private sectors through a three-tiered system. The government also tailors its budgetary schemes to various recovery and reconstruction needs, in accordance with the magnitude and characteristics of the disasters. Lastly, the chapter discusses sovereign risk pools and bilateral development loans, both as disaster countermeasures.

### 1 Introduction

The Great East Japan Earthquake in 2011 was one of many reminders that Japan is a disaster-prone country. According to the official statistics, the earthquake and subsequent tsunami resulted in 15,894 fatalities, as well as 2,546 people missing, and 6,156 injured.<sup>1</sup> In addition, more than 120,000 buildings were completely destroyed and some major roads and railways collapsed, cutting lifelines for local residents. The recovery is still ongoing.

The events of 2011 are not new. Throughout its history, Japan has faced various types of natural disasters, including earthquakes, tsunamis, typhoons, and volcanoes, all of which resulted in a great number of human lives being lost, key infrastructure being destroyed, and social and business activities being damaged. For instance, in

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<sup>1</sup>National Police Agency, December 8, 2017.

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the Great Kanto Earthquake of 1923, one of the largest natural disasters experienced in the country, the death toll totaled 142,807 people, most of whom were killed in fire incidents. The Fukui Earthquake of 1948 caused the deaths of more than 5,000 people and the Great Hanshin–Awaji Earthquake of 1995 killed more than 6,000 people. Moreover, even today, the risk of future disasters remains imminent: for instance, there are 110 active volcanoes in Japan, which accounts for more than 7% of all the active volcanoes throughout the globe in 2014.

In the face of these challenges, Japan has developed various disaster risk management (DRM) tools, along with corresponding financing measures. However, there has been no attempt to conduct a comprehensive analysis of Japan's disaster risk financing (DRF) framework.<sup>2</sup> This chapter is the first attempt to discuss the key characteristics of DRF tools in Japan as of mid 2018. Specifically, it provides a broad overview of Japan's DRF tools, and of its bilateral and multilateral tools that assist developing partners to prepare DRF policies.

This chapter is divided into five sections. The first section reviews the basic frameworks for DRM and DRF in Japan. In Sects. 2 and 3, we discuss two of Japan's DRF tools, earthquake insurance and the budgetary response to earthquakes. The Ministry of Finance, as the fiscal authority, plays a central role in these tools by designing the policy framework. Then, Sect. 4 reviews the cross-border DRF tools provided by the Japanese government, targeted at assisting countries with a limited capacity to cope with disasters. Section 5 summarizes the findings and discusses some implications and future issues.

## 2 Basic Frameworks for DRM and DRF in Japan

Before discussing the DRF framework, it is useful to describe Japan's overall DRM framework and strategy, as DRF is a critical component of the country's national DRM framework (see OECD 2012; Clarke and Dercon 2016). Japan's DRM structure was first established when the *Disaster Countermeasures Basic Act* was enacted in 1961, following a series of typhoons in 1959. The Act requires the central and prefectural governments to produce national and regional disaster management plans, respectively. The national plan comprehensively sets out three different stages of policy responses, comprising (i) prevention, (ii) emergency response, and (iii) restoration and reconstruction (Government of Japan 1963).<sup>3</sup> The greatest emphasis is placed on the prevention stage, based on the concept that prevention is the best way to safeguard the lives and properties of citizens.<sup>4</sup> Below, we examine each stage in order.

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<sup>2</sup>Although global and regional surveys exist (OECD 2013, 2015), they lack in-depth investigations of country-specific circumstances.

<sup>3</sup>The national plan elaborates on the characteristics of these three policy responses for 15 different types of disasters, including both natural and man-made disasters, as well as features that are common to all disasters.

<sup>4</sup>See Articles 1 and 35 of the *Disaster Countermeasures Basic Act*.

**Prevention.** At the *prevention* stage, the government is committed to preparing a set of policy menus. The first set of policies makes disaster prevention a priority in urban planning, builds infrastructure that is resilient to potential disasters, and ensures that lifeline facilities are fully functional. Such activities aim to directly mitigate the impact of future disasters.

The government is also committed to raising awareness, providing necessary training, and promoting knowledge sharing, on the grounds that the number of casualties from disasters can be greatly reduced when populations are well prepared. Various preparatory measures, such as assigning lead authorities, determining their cooperation arrangements, and safeguarding adequate resources, are included in the plan. Moreover, the plan requires the government to enhance research and analysis on the magnitude and probability of potential disasters because ensuring an adequate risk assessment capacity is indispensable in successful DRM.

**Emergency response.** An *emergency response* must be provided immediately after any disaster. The national plan elaborates a possible order of emergency responses, including immediate alerts, evacuation, rescue activities, and the provision of living support (supplies of food, medical services, and shelter). Further, the respective roles of different organizations—various ministries at the national level, local governments, and the private sector—are specified in detail in the plan. The emphasis is placed on how to secure accurate information flows, given that post-disaster turmoil may compromise proper decision-making based on facts and data.

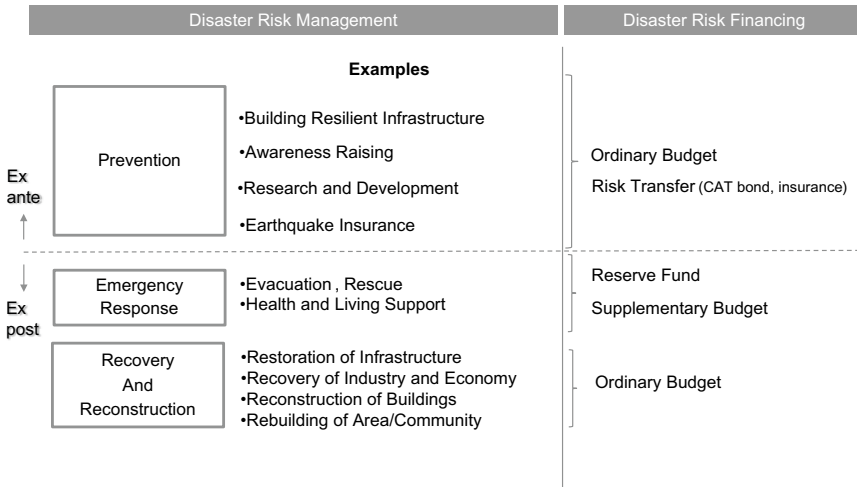
**Recovery and reconstruction.** The emergency operation is followed by *recovery and reconstruction* actions, which may extend over many years and which include the restoration of infrastructure, transportation, and basic institutions, as well as ensuring credit lines to small and medium-sized enterprises. The plan spells out the necessary steps to recover the viability of the regional economy and requires the government to provide an enabling environment for business developments and urban planning, as well as access to social welfare and education.

Although the national plan itself does not elaborate the DRF scheme in detail, we can map out the domestic DRF tools by matching them to each stage of the DRM framework, as shown in Fig. 1.<sup>5</sup> In line with DRM, DRF makes prevention (risk mitigation and reduction) a priority (World Bank Group 2019).

First, at the prevention stage, the government uses its ordinary budget to implement various DRM measures, such as building infrastructure that is resilient to potential future disasters. When building the infrastructure, a comprehensive cost–benefit analysis is undertaken, examining the cash flows for the entire life of the projects, including not only upfront construction costs but also maintenance and repair costs.

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<sup>5</sup>The Director-General for Disaster Management in the Cabinet Office, a central government hub for DRM, secures a certain amount of its own budget for DRM (6.2 billion yen for FY2018). However, this budget item does not encompass all the spending on the DRF tools. DRF expenditure on items such as financing sources for resilient infrastructure and contingency reserves are outside this budget.



**Fig. 1** Conceptual framework for DRM and DRF. *Source* Author

Then, there are a wide variety of DRF tools used to finance the emergency measures. For instance, both the national and local governments use their respective accumulated reserves.<sup>6</sup> Every year, the national government sets aside “disaster recovery expenditure” in addition to the general contingency reserve that can be used for various purposes (for the general reserve, see Box 1). Often, the disaster recovery expenditure in the initial budget is not sufficient to cover all the natural disasters, and supplementary budgets must be formulated.<sup>7</sup> In addition to the national government’s efforts, local governments tend to accumulate reserves that are specifically dedicated to both disaster prevention and recovery.<sup>8</sup>

Alternatively, the government can formulate a supplementary budget that will need to be passed in the Diet, without resorting to its annual reserves. Such supplementary budgets can be financed by temporary taxes, the issuance of bonds, the reallocation of other budget items, or a combination of these. The government could resort to emergency credit lines from international partners, but such an option is less likely given that Japan is an advanced economy.

<sup>6</sup>As it must be accumulated well before a disaster, the reserve can be categorized as an ex ante measure. See OECD (2012).

<sup>7</sup>For instance, from FY2013–FY2017, on average, the amount of disaster recovery expenditure in the initial budget was 73,261 million yen, whereas that in the supplementary budget was 214,052 million yen.

<sup>8</sup>See [http://www.soumu.go.jp/iken/h28\\_118776.html](http://www.soumu.go.jp/iken/h28_118776.html) (in Japanese only).

Finally, at the recovery and reconstruction stage, fiscal support needs to be secured through ordinary budgets, given its medium-term nature. The total budget for disaster countermeasures cannot be determined, as it is spread out among different budget areas, such as infrastructure investment, education, social security, agriculture, and so on.

Apart from government financing, the private sector plays a role in preparing post-disaster expenditure. An example is the issuance of catastrophe bonds (CAT bonds), in which bondholders receive a higher interest rate but must give up repayment of the bond's principal when a contractually predetermined type of catastrophe occurs. Effectively, the issuance of CAT bonds enables the issuer to transfer the risk to investors. CAT bonds are becoming common in Japan, as information in the press suggested that the total issuance amount totaled 220 billion yen in February 2016.<sup>9</sup> One example is the MUTEKI bonds, which are CAT bonds issued by the Japan Agriculture (JA) mutual aid system and which resulted in 100% loss of the principal immediately after the Great East Japan earthquake in 2011. The investors' loss meant a parallel benefit to the issuer (i.e., JA), which then used the proceeds for payments to insured farmers.

### **Box 1: Use of the general contingency reserve**

Each year, the national government establishes a 250–350 billion yen contingency reserve in the general account. It is used for unexpected expenditure, including responses to disasters such as earthquakes or floods. Examples of other items for which the reserve is used include (i) preventing domestic animal infectious diseases, (ii) organizing by-elections, (iii) filling gaps in lawsuit costs, and (iv) urgent responses to national and international security issues.

Because the money is not ring-fenced for disaster response, there is always a risk that there will not be sufficient money left when a disaster occurs. Historical records suggest that the money has been sufficient to cover disaster-related expenses, partly because the government tends to use other DRF tools (such as the supplementary budget) to cover damages.

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<sup>9</sup>Nikkei Shimbun, February 8, 2016.

(billion JPY)		
	Disaster-related expenses	Other expenses
FY2010	67.8 • Response to the Great East Japan Earthquake	97.1 • Control for domestic animal infectious diseases
FY2011	63.3 • Response to the Great East Japan Earthquake • Disposal of disaster waste after heavy rainfall • Removal of snow after heavy snow	11.5 • Additional lawsuit costs
FY2012	6.2 • Response to the flood in northern Kyushu district and the typhoon	107.0 • General election by the dissolution of the House of Representatives
FY2013	–	25.4 • Prevention of leakage of polluted water
FY2014	44.8 • Agricultural support against heavy snow	123.5 • General election by the dissolution of the House of Representatives

*Note* Fiscal Year starts in April and ends the following March  
*Source* Author, based on the Ministry of Finance sources

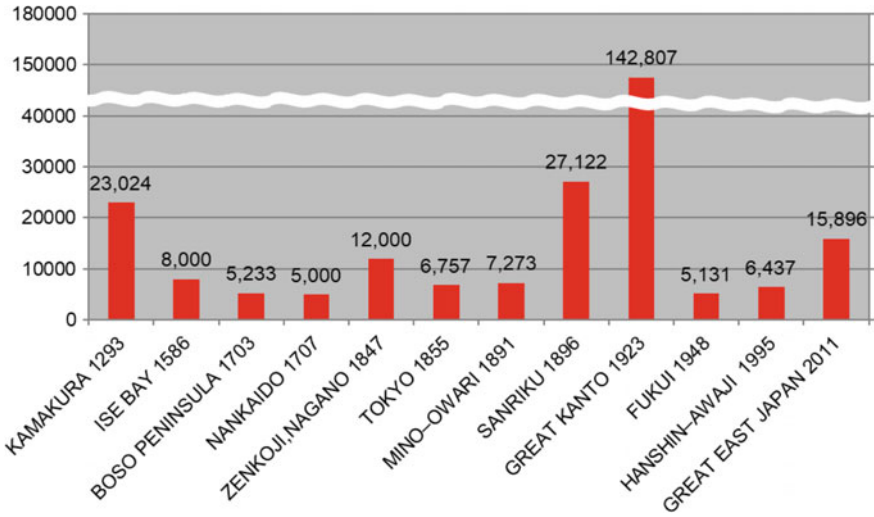
### 3 Earthquake Insurance

#### 3.1 Origin

As mentioned in the Introduction, Japan is a country beset by earthquakes. Figure 2 presents a history of earthquakes that resulted in casualties of more than 5,000 people, with the oldest case going back to 1293. One of the worst earthquakes was the Great Kanto Earthquake in 1923, which resulted in 142,000 casualties. Further, as Japan is located at the junction of four tectonic plates, it is anticipated that it could face another massive scale earthquake along the Nankai Trough and severe related disasters in the near future.<sup>10</sup>

Against this backdrop, the need for earthquake insurance has been advocated for a long time in Japan. In 1878, a German professor, Dr. Myett, proposed a nationally

<sup>10</sup>For instance, the government earthquake investigation committee estimates that the likelihood of a potential massive Nankai Trough earthquake in the next 30 years ranges from 70 to 80% (Headquarters for Earthquake Research Promotion 2018).



**Fig. 2** Number of casualties in earthquakes. *Sources* Reproduced from NGDC/WDS (2018), Cabinet Office Japan (2018), and National Police Agency (2018)

organized earthquake insurance system, but did not obtain sufficient support from the Japanese government or industry. The hesitation arose for the following three reasons: (i) it is difficult to apply the law of large numbers to earthquakes, given the low frequency of incidents compared to other natural disasters; (ii) the cost of the damage can be prohibitively high and it may be difficult to cover it through insurance; and (iii) adverse selection may be difficult to avoid (General Insurance Rate Organization of Japan (GIROJ) 2014).

However, a series of earthquakes in the first half of the twentieth century pushed the government and industry to reconsider earthquake insurance. Although not officially discussed in the Diet, the government proposed a draft earthquake insurance scheme in 1934 and 1949, and the private sector initiated its own study from 1952.

An industry group had just established an expert committee for further investigation of the earthquake insurance system when the Niigata earthquake of 1964 occurred. It caused 26 deaths, with 447 people injured, and the destruction of 1,960 residences. Following this incident, the then Minister of Finance Kakuei Tanaka, who was originally from the earthquake-hit Niigata prefecture, consulted with the Ministry's insurance council to consider a concrete policy response to possible future earthquakes. After a two-year deliberation in the council, the first earthquake insurance scheme was established in 1966.

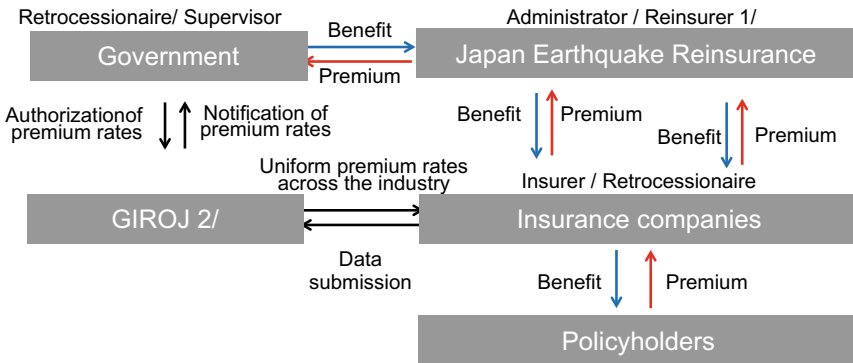
The primary objective of the earthquake insurance was to bring back stability to victims' lives. Thus, it covered residential buildings and households only (i.e., not

commercial properties).<sup>11</sup> Because of the potentially large damage from an earthquake, it was determined that the government would partly reinsure a portion of the government insurance, as discussed below. The sheer size of potential losses over a long period justifies the involvement of the government.

### 3.2 Structure

One of the key characteristics of earthquake insurance is that the government reinsures the liability of the private sector to achieve the long-term sustainability of the insurance system (Fig. 3). Specifically, policyholders buy earthquake insurance automatically as an attachment to their home fire insurance policy, unless they explicitly decline to do so. Then, all the money from the insurance companies is reinsured by a special purpose company, Japan Earthquake Reinsurance (JER). JER pools all the insurance premiums across the country and keeps part of the money, while distributing portions to the government and the private sector, effectively distributing risks to relevant parties.<sup>12</sup>

The premium rate is determined by the General Insurance Rate Organization of Japan (GIROJ), an industry group that is mandated to calculate and provide a



1/ Administers the earthquake insurance pool and manages pooled reserves.  
 2/ General Insurance Rating Organization of Japan.

**Fig. 3** Overview of the earthquake insurance scheme. *Source* Author, based on the Ministry of Finance

<sup>11</sup>Over time, earthquake insurance has expanded its coverage, such that the current earthquake insurance can be viewed as akin to property insurance (Earthquake Insurance Project Team 2012).

<sup>12</sup>The shares of the government, JER, and the private sector are 78%, 20%, and 2%, respectively.



reference insurance rate to member companies.<sup>13</sup> As far as the earthquake insurance is concerned, the premium rate is set uniformly by the GIROJ and needs to be approved by the Financial Services Agency. Box 2 summarizes the key characteristics of the earthquake insurance scheme.

### Box 2: Summary of earthquake insurance

- **Insurance coverage:** Residential buildings and household goods
- **Method of contract:** In principle, automatically attached to fire insurance policy (automatic offer, attached if not rejected by the insured)
- **Loss to be indemnified:** Loss or damage through fire, destruction, burying or washing away caused directly or indirectly by any earthquake or volcanic eruption, or resulting tsunami

Total loss: 100% of insured amount

Large half loss: 60% of insured amount

Small half loss: 30% of insured amount

Partial loss: 5% of insured amount

- **Insurable proportion:** Between 30 and 50% of the fire insurance policy
- **Limit of insured amount:** Residential buildings: JPY 50 million, household goods: JPY 10 million
- **Aggregate limit of indemnity:** JPY 11.3 trillion per earthquake, shared between the private sector (JPY 0.17 trillion) and the government (JPY 11.13 trillion).

Earthquake insurance coverage as an option automatically attached to fire insurance was introduced in 1980, with a view to addressing adverse selection. In addition, the intention was to encourage private insurance companies to promote the use of earthquake insurance because profit-maximizing firms would not otherwise actively sell such insurance (Earthquake Insurance Project Team 2012). However, the introduction of the automatic attachment policy did not significantly alter the market penetration rate during the 1980s or early 1990s (Fig. 4). While the exact reason for this initial low uptake rate is unclear, the penetration rate did improve after the Great Hanshin–Awaji Earthquake in 1995 and the Great East Japan Earthquake in 2011, as the general public was forced, painfully, to realize the necessity of the insurance.

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<sup>13</sup>Currently, the insurance rate is from 0.068 to 0.363%, depending on the risk of the area and whether buildings are fireproof. There is a discount if the residence is deemed resilient to earthquakes. Long-term policies also receive a preferable treatment in relation to the premium.

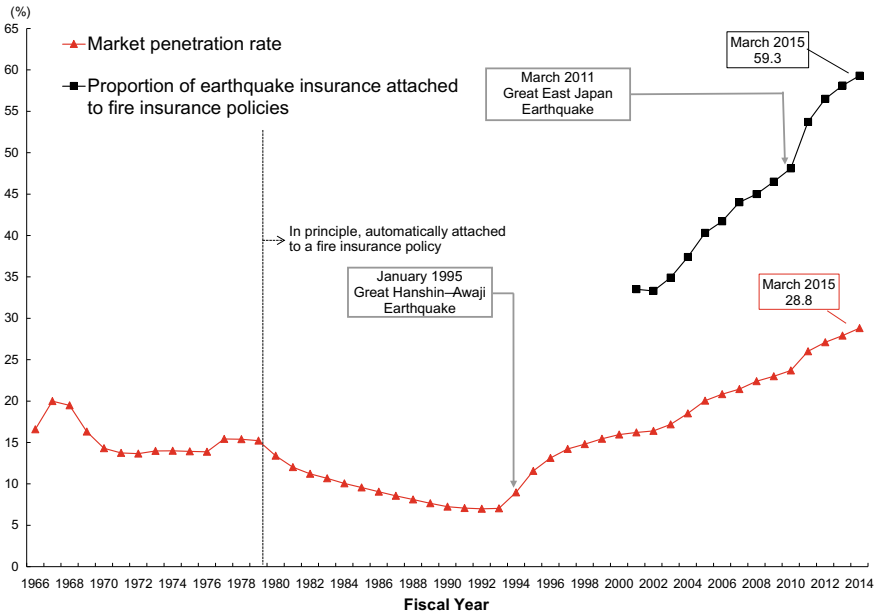


Fig. 4 Market penetration rate. Source Author, based on Ministry of Finance documents

### 3.3 Three-Tiered Burden-Sharing System

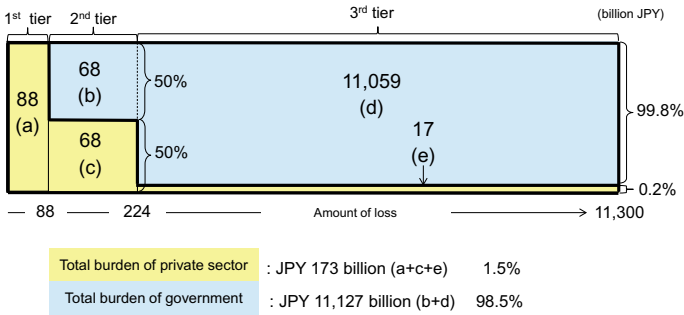
The aggregate insured amount is determined based on a potential large-scale earthquake of the same magnitude as the Great Kanto Earthquake (1923). Currently, it is set at 11,300 billion yen, or around 2% of GDP.<sup>14</sup>

Although the JER distributes *insurance premiums* between the government and private insurance companies, another question is how the *burden of payments* for earthquake insurance claims is shared between the two parties. The Japanese government introduced a tiered system, under which the greater is the damage from an earthquake, the higher is the responsibility of the public sector. The underlying idea was to strike the best balance between the principle of insurance and fiscal support: If the loss is manageable, the law of large numbers indicates that the loss should be fully covered by the private sector only, which matches benefits paid and premiums as a whole. Conversely, if the loss is so large that insurance companies cannot bear it by themselves, government intervention is justified.

More specifically, Japan’s earthquake insurance scheme introduces a three-tiered burden-sharing system (Fig. 5):

- The first tier involves the private sector only covering the burden;
- The second tier involves the private and public sectors equally sharing the burden;
- and

<sup>14</sup>If the damage exceeds this limit, extra fiscal support may be considered on a case-by-case basis.



**Fig. 5** Structure of burden-sharing between private and public sectors. *Source* Ministry of Finance

– The third tier involves most of the loss being covered by the public sector.

The exact threshold for each tier that triggers liability is carefully determined to ensure that the private sector’s burden does not exceed its capacity, but also to ensure that the private sector burden is not too low because excessive government assistance may create a moral hazard. Thus, under the first tier (“(a)” in Fig. 5), the loss amount covered, 88 billion yen, is double the amount of annual premium payments, meaning that the private sector should at least cover earthquake-related costs up to twice the amount of the insurance companies’ annual income. Then, the private sector’s burden in the first and second tiers combined (“(a)” and “(c)” in Fig. 5) is determined by half the amount of the outstanding stocks of reserves held by the private sector, which is 156 billion yen. Because the private sector’s burden is set as half of its reserves, it can retain sufficient absorbing capacity if another earthquake occurs. In the second tier, the public and private sectors split their burden in half (68 billion yen each). Thus, the threshold for the third tier is calculated as 224 billion (the sum of the first and second tiers). In the third tier, the private sector’s burden (“(e)” in Fig. 5) is confined to the expected increase of the reserves, so that the private sector reserves (stocks) do not decrease.

To summarize, (a), (b), and (c) are calculated based on the following formula:

$$a = 2X,$$

$$a + c = \frac{1}{2}Y,$$

$$e = E(\Delta X),$$

where

*X* Premium (flow)

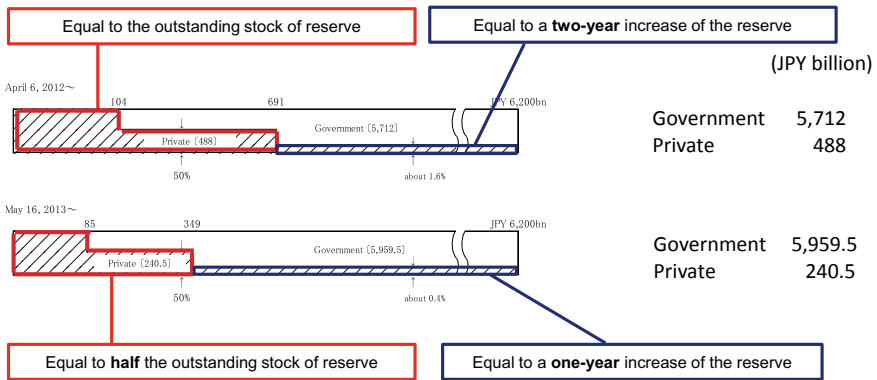
*Y* Reserve (stock).

The reasons for setting the first tier at twice the insurance companies’ annual income or for establishing the private sector’s burden in the first and second tiers combined as equal to half the amount of the reserves are matters of policy judgment. For instance, before the Great East Japan Earthquake in 2011, the formula above were set as follows:

$$a + c = Y$$

$$e = 2E(\Delta X)$$

After 2011, the liability of the private sector exceeded the total reserves, which dropped sharply post-disaster from around 1.0 trillion (February 2011) to 0.5 trillion (March 2012) because of large-scale payments to the victims of the earthquake and subsequent tsunami. Thus, revisions were made in May 2013 to alter the formula to its current version and eliminate the excess liability of the private sector (Figs. 6 and 7).



**Fig. 6** Revision after the Great East Japan earthquake. *Source* Author, based on Ministry of Finance

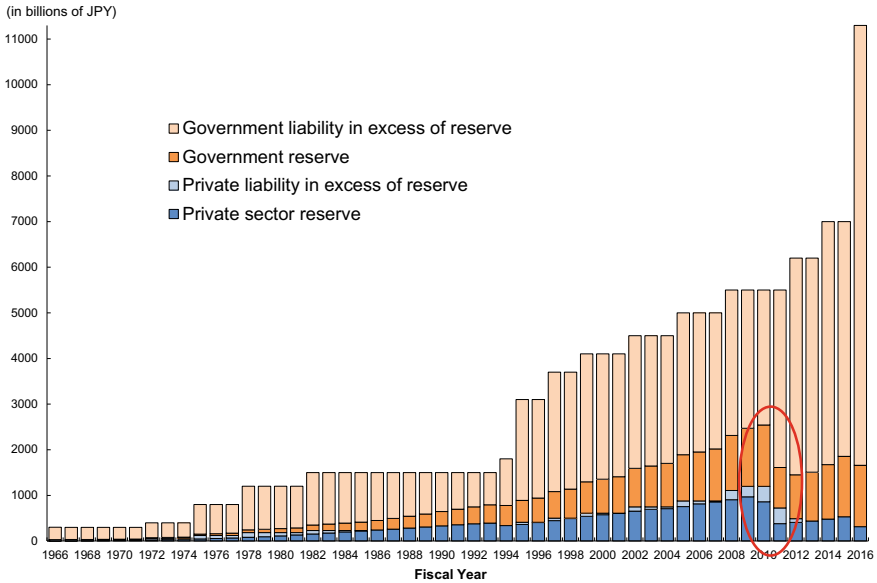


Fig. 7 Evolution of liability and reserves. *Source* Author, based on Ministry of Finance

### 3.4 Activation Record

The government payment (i.e., the second and third tiers) has not been used for all the earthquakes, but it was activated for the Great Hanshin–Awaji (1995), Great East Japan (2011), and Kumamoto (2016) Earthquakes. The limited number of cases in which government payments have been activated, despite a series of large-scale earthquakes, may suggest that the coverage of the earthquake insurance is not wide enough in earthquake-hit areas.<sup>15</sup> This question needs to be explored further in future research (Table 1).

## 4 Fiscal Framework for Recovery and Reconstruction from Earthquakes

This section examines the fiscal framework that is employed for reconstruction following large earthquakes. By investigating three examples—the Great Hanshin–Awaji Earthquake in 1995, the Great East Japan Earthquake in 2011, and the recent

<sup>15</sup>For instance, the penetration rate of Hyogo prefecture, which was the most severely affected by the Great Hanshin–Awaji Earthquake, was 4.8% in FY1994, compared to the then-national average of 9.0%.

**Table 1** Past ten major earthquakes and activation of government payments

	Earthquake	Date	Magnitude	Number of policies	Claim paid	
					(JPY Billion)	Paid for government
1	Great East Japan	Mar-11	9.0	807,152	1,274.9	580
2	Kumamoto	Apr-16	7.3	200,029	375.3	130
3	Great Hanshin–Awaji	Jan-95	7.3	65,427	78.3	6.2
4	Offshore Miyagi Prefecture	Apr-11	7.2	31,005	32.4	–
5	West of Fukukoka Prefecture	Mar-05	7.0	22,066	17.0	–
6	Geiyo (Hiroshima and Ehime Prefectures)	Mar-01	6.7	24,452	16.9	–
7	Mid Niigata Prefectures (2014)	Oct-04	6.8	12,608	14.9	–
8	Mid Niigata Prefectures (2007)	Jul-07	6.8	7,869	8.2	–
9	Western Offshore Fukukoka Prefecture	Apr-05	5.8	11,337	6.4	–
10	Offshore Tokachi (Hokkaido Prefecture)	Sep-03	8.0	10,553	6.0	–

Source Ministry of Finance

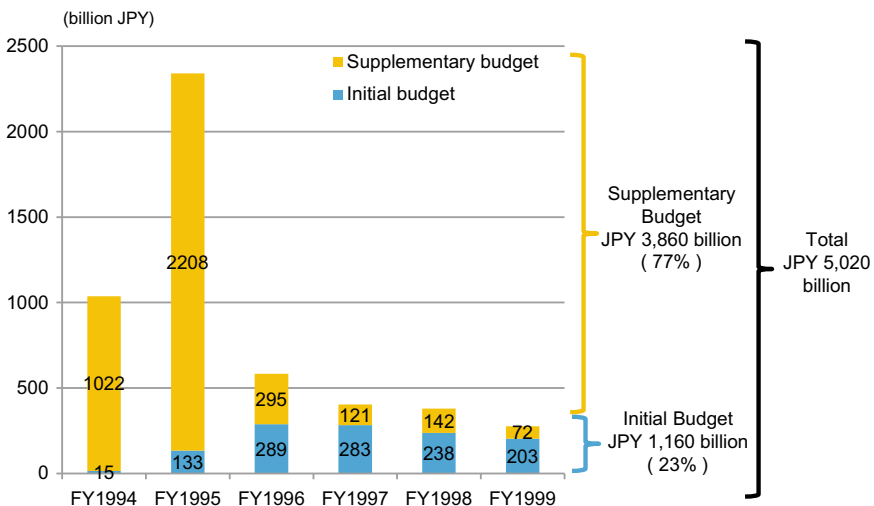
Kumamoto Earthquake in April 2016—the section illustrates how Japan tailors different fiscal tools to different cases, depending on the damage and duration of the post-disaster impact.

### 4.1 Great Hanshin–Awaji Earthquake (1995)

The Great Hanshin–Awaji Earthquake occurred in January 1995 and resulted in 6,437 casualties. Immediately after the earthquake, the government formulated a supplementary budget for the emergency response (including the rescue operation) and restoration of lifelines, which amounted to more than one trillion yen. In the next fiscal year, other large-scale supplementary budgets were prepared to cover immediate needs, including the restoration of infrastructures such as public schools and medical care facilities. In addition, the government began to include, in its ordinary initial budgets, an amount for ongoing annual recovery costs, which were used for costs such as support for small and medium-sized enterprises, disaster countermeasures, employment support, and to build resilient cities. The sizes of both the initial budgets and supplementary budgets were reduced over time, reflecting the progress of the recovery.

In the end, the total expenditure for emergency aid, restoration, and reconstruction amounted to 5,020 billion yen in total (roughly 1% of GDP at the time). Nearly 77% of the financing resources came from the recurring supplementary budgets (Fig. 8).

Historically, Japan has relied on supplementary budgets every year for various purposes, such as stimulus packages, responses to disasters, and urgent needs to enhance the national defense capacity. Hence, the active use of supplementary budgets itself was not special. What was notable was the accelerated implementation of the emergency and recovery operation, as suggested by the size of the supplementary budgets in FY1995, which accounted for more than 40% of the total package.



**Fig. 8** Financing of the reconstruction after the Great Hanshin–Awaji Earthquake. *Source* Author, based on Ministry of Finance

## 4.2 Great East Japan Earthquake (2011)

The Great East Japan Earthquake and the subsequent tsunami resulted in a devastating amount of damage. The government concluded that merely combining the supplementary budgets and increasing ordinary budgets would be insufficient as a fiscal response. Therefore, in April 2012, a special account (the *Special Account for Reconstruction from the Great East Japan Earthquake*) was established, with a view to ring-fencing revenue and expenditure for the purpose of reconstruction from the ordinary budgeting process under the general account.

The revenue in this special account came from special taxes and bond issuances and the expenditure it covered included reconstruction project costs and redemption of reconstruction bonds (Fig. 9). The special taxes comprised personal income tax (+2.1%), corporate tax (+10%, until its expiry in FY2013), and local residence tax (JPY 1,000).

One peculiar aspect of this special account is that it was designed as a temporary account. Initially, the framework was established for a period of five years, based on the assumption that the reconstruction could be largely completed within that

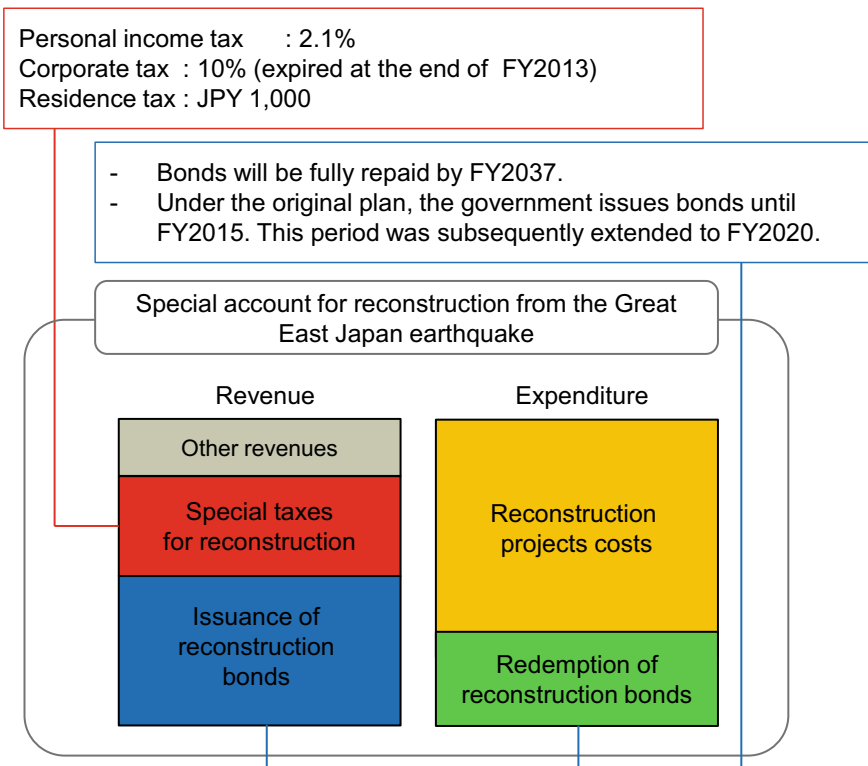
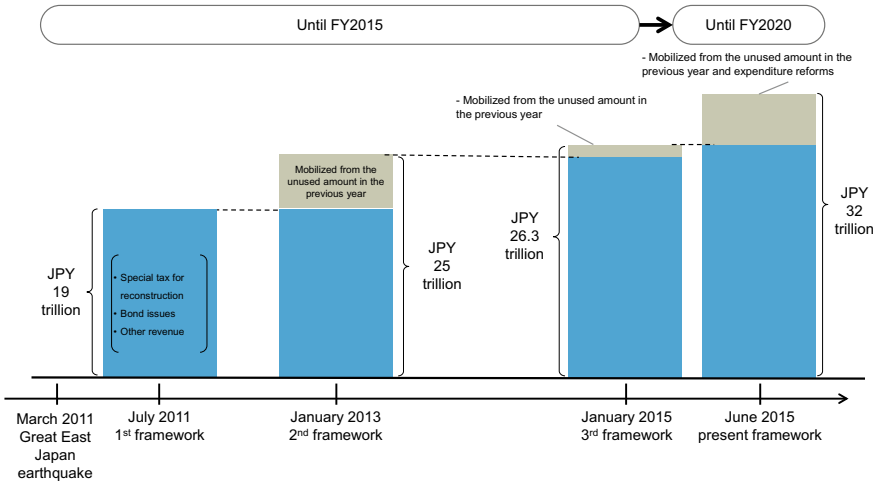


Fig. 9 Overview of the special account for reconstruction. Source Author





**Fig. 10** Evolution of the size of the reconstruction special account. *Source* Author

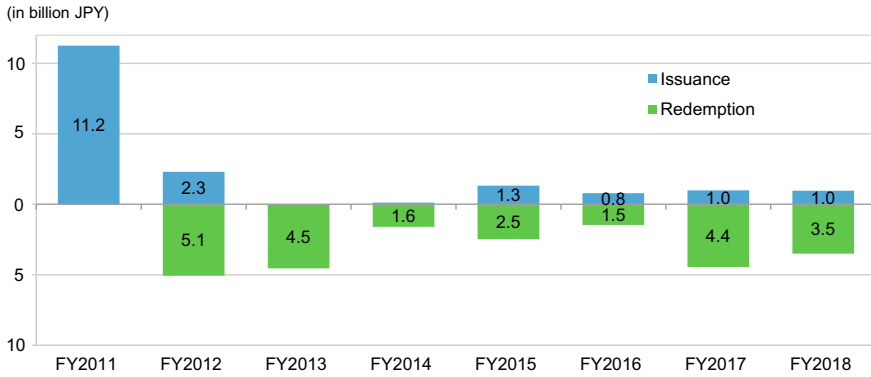
time frame. The bond repayment and issuance schedule, as well as the temporary tax hike, were meant to finish after five years (i.e., by FY2015), with the size of the total package being 19 trillion yen. However, over time, the size of the reconstruction package was increased, rising to 25 trillion in January 2013 and then 26.3 trillion in January 2015. Before the end of the planned five-year period, in June 2015, the government decided to extend the framework over another five years to FY2020, and increased funds to 32 trillion yen in total.

This series of gradual increases in the size of the reconstruction project suggests that there was strong pressure for increased expenditure from line ministries. Further, the extension of the recovery and reconstruction period indicates that the recovery and reconstruction are taking a much longer time than was originally planned (Fig. 10).

It should be noted that the bond issuance was used as a tool to accelerate the expenditure. In the first year, revenue from issuing reconstruction bonds was used for project costs and then, using the special tax revenue (and, to a lesser extent, transfers from a general account), the debt was repaid in the following years (Fig. 11). In other words, the bond issuance scheme allowed the government to accelerate implementation of reconstruction projects by relying on future tax increases.

### 4.3 Kumamoto Earthquake (2016)

While the impact of the Kumamoto Earthquake was huge, the expected expenditure on fiscal support was not as large as that following the Great East Japan Earthquake. As an initial response, the government formulated a supplementary budget of 778 billion yen, tapping into unused money (mainly by reducing the interest payment



**Fig. 11** Issuance and redemption schedule of reconstruction bonds. *Source* Author. *Note* Figures in FY2011–FY2016 are settled figures; Figures in FY2017 are based on the supplementary budget; figures in FY2018 are based on the initial budget.

expenditure). As the memory of the Great East Japan Earthquake remained vivid, expenditure pressure from the line ministries was high. However, the government carefully assessed the immediate impact, and avoided unnecessary increase in expenditure.

#### 4.4 Summary

The Japanese government tailors various fiscal tools to case-specific circumstances, in particular the fiscal requirements and severity of the earthquake in question. This is demonstrated by its use of supplementary budgets (Great Hanshin–Awaji Earthquake), a dedicated special account framework (Great East Japan Earthquake), and reallocation of expenditure (Kumamoto Earthquake). In the case of the Great East Japan Earthquake, the government employed reconstruction bonds as a tool to accelerate recovery and reconstruction by relying on future tax revenue. As a general lesson, fiscal authorities need to carefully assess the necessity and the extent of increasing budgets in response to requests from line ministries. In addition, it is essential to expedite reconstruction and prevent a prolonged reconstruction period in the long run.

## 5 Japan's Efforts to Promote DRF in the International Arena

As discussed in the previous sections, Japan has a full suite of DRM measures to tackle domestic disasters. In addition, it prioritizes disaster countermeasures in the international diplomacy and development spheres. For instance, Japan led the

discussion in setting international standards on DRM in forums such as the Hyogo Framework for Action (2005) and the Sendai Framework for Disaster Risk Reduction (2015). Further, in 2014, the Japanese government committed US\$ 1 million to the Japan–World Bank Program for Mainstreaming Disaster Risk Management in Developing Countries, and helped establish the World Bank Tokyo DRM Hub, the mandate of which is to extend Japanese and global expertise in DRM to developing countries through sharing of knowledge and country-based programs.<sup>16</sup>

Financial protection is one of the key elements of resilience, as highlighted by the Sendai Framework. Thus, our next question is whether Japan is equipped with sufficient DRF tools to support its strong leadership in DRM. This section reviews Japan's efforts to provide DRF to international partners, at both pre-disaster and post-disaster stages.

For the pre-disaster stage, Japan promotes resilient infrastructure in its bilateral and multilateral assistance programs. In March 2015, Japan announced the Sendai Cooperation Initiative for Disaster Risk Reduction (DRR), which aims at mainstreaming DRR in all development policies and planning. One of the pillars of this initiative is investment in DRR from the long-term perspective, noting that prior investment in DRR is more cost effective than post-disaster emergency response and recovery and that it contributes to sustainable development. Based on this idea, the Japanese government was committed to providing US\$ 4 billion assistance and capacity building for 40,000 people from 2015 to 2018 in its official development assistance program. The government envisages that mobilizing financial resources to develop resilient infrastructure will assist in incentivizing developing partners to pay more attention to DRM.

For the post-disaster stage, Japan's initiatives include both bilateral and multilateral assistance. In regard to DRF tools for bilateral assistance, the Japan International Cooperation Agency has specific disaster-related emergency assistance programs, ranging from dispatching experts to providing living support.<sup>17</sup> During 1987–2017, 144 emergency response teams, which included rescue, medical, pandemic, self-defense, and other personnel, were dispatched. Living support has been provided in 511 cases for 43 disaster-hit countries and areas (as of June 2017). Grants are available for either governments or international organizations that are engaged in rescue operations in disaster-hit areas.

Further, in April 2013, the Japanese government created a new menu of bilateral assistance, called Stand-by Emergency Credit for Urgent Recovery, or SECURE. Under SECURE, the requesting country can seal an exchange of notes and loan agreement well before a disaster, so that loan disbursement for immediate needs can be expedited based on declaration of a trigger, with minimal post-disaster paperwork. By the end of 2017, SECURE had been used by Peru (US\$ 10 billion worth of assistance), El Salvador (US\$ 5 billion), and the Philippines (US\$ 50 billion).

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<sup>16</sup>As of November 2017, the program had provided technical assistance worth US\$ 58 million and facilitated US\$ 2 billion worth of World Bank loans.

<sup>17</sup>Under this program, “disaster” is defined as including both natural and man-made disasters, but not conflicts.

The Japanese government is a pioneer in promoting DRF in multilateral forums, particularly in establishing regional risk pools. For instance, Japan provided a grant for a World Bank study investigating the establishment of a risk pool in the Caribbean region in 2015. Such regional risk pools have multidimensional benefits, such as diversifying risks, establishing joint reserves, transferring excess risks, sharing operational costs, and building a better foundation of risk information (World Bank Group 2017). Japan's initiative in this regard attracted support from other donor countries and culminated in the establishment of the first multi-country catastrophe risk pool, the Caribbean Catastrophe Risk Insurance Facility (CCRIF) in 2007.

Moreover, Japan has taken a leading role in establishing another regional DRF framework for the Pacific Island countries (PICs), the Pacific Catastrophic Risk Assessment and Financing Initiative (PCRAFI). When they are hit by national disasters, most PICs face critical financial challenges. They find it difficult to secure immediate liquidity for swift post-disaster emergency responses without compromising their long-term fiscal balance because they are constrained by their size, borrowing capacity, and limited access to the international insurance market. Against this backdrop, in January 2013, Japan provided financial support to the Secretariat of the Pacific Community and the World Bank, which then jointly started the PCRAFI. Then, other donors such as Germany, the United Kingdom, and the United States participated in this initiative as part of the G7 InsuResilience Global Partnership.<sup>18</sup> The PCRAFI Facility has its insurance contracts partly reinsured with private sector re-insurers so as to partly transfer the risk exposure to market participants.<sup>19</sup>

Japan was involved deeply in designing the PCRAFI scheme. While a special purpose vehicle collects insurance premiums from the insured PICs, during the initial phase of the scheme (2013–2015), the insurance premium was fully subsidized by Japan as additional assistance, except in the case of the Cook Islands. This support facilitated the participation of the insured countries at the initial stage of the scheme, assisting to give the participants a sense of ownership as insurance holders.

These developments were followed by other regional sovereign risk pools, such as the African Risk Capacity, which commenced their first policies in 2014. Currently, if all three existing sovereign risk pools are considered in combination, 27 countries have utilized the regional facilities.<sup>20</sup> These facilities tend to be supplemented with their own technical assistance programs, which serve as knowledge hubs in building catastrophe risk models and accumulating necessary expertise (for more details, see World Bank Group 2017).

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<sup>18</sup>At the Elmau Summit in 2015, under the German Presidency, the G7 countries set a goal to increase the number of people who have access to direct or indirect insurance coverage against climate hazards in vulnerable developing countries from 100 to 400 million by 2020. By combining “insurance” and “resilience”, the initiative was named “InsuResilience”.

<sup>19</sup>PCRAFI covers 80% of all losses below a 1-in-20-year event, while transferring the rest of the exposure to reinsurers, 20% of all losses below a 1-in-20-year event and 100% of all losses above a 1-in-20-year event (2016–17 Business Plan).

<sup>20</sup>16 CCRIF countries (2017/18 policy year), 5 PCRAFI countries (2017/18 policy year), and 6 ARC countries (2016/17 rainfall season).

## 6 Conclusion

Any government must consider the wise usage of its own DRF tools, which must be based on a comprehensive national DRM system. Japan is not an exception, and it has a wide range of DRF tools that correspond to the different DRM stages, i.e., prevention, emergency, and recovery and reconstruction, in accordance with its *Disaster Countermeasure Basic Act*. Private sector market participants use their own DRF tools, such as insurance and CAT bonds.

Japan's earthquake insurance has been developed based on its long history of recurrent earthquakes. A means of burden-sharing between the public and private sectors is established in a three-tiered system, with due consideration given to the private sector's capacity to pay for the benefits to victims. Improving the market penetration of earthquake insurance held by Japanese citizens should be a further goal.

The government tailors different budgetary schemes to the various disaster-related needs. In accordance with the magnitude and characteristics of the disasters, the fiscal authorities have selected a financing solution that includes aspects such as the use of supplementary budgets, the creation of a special account, or the reallocation of expenditure. The fiscal authorities face challenges in fine-tuning the size and the length of the reconstruction packages, particularly when reconstruction takes longer than originally envisaged.

The Japanese government provides various DRF solutions in the international development area, given its leading role in DRM. In particular, Japan is committed to securing bilateral loans for DRR for 2015–18, and it provides bilateral loans to countries in need in an expeditious manner through disaster response teams or SECURE. It also plays an eminent role in designing DRF solutions on the multilateral front, in particular through establishing regional sovereign risk pools, such as the CCRIF and the PCRAFI. Japan will continue to contribute to global efforts for the development of DRF across the board.

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