Chapter 9

Adaptive Solutions: What is the Role of Financial Institutions and Insurance Industry?

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CHAPTER 9

Adaptive Solutions: What is the Role of Financial Institutions and the Insurance Industry?

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9.1 Introduction

Asia and the Pacific face a significant impact from natural disasters. Since 2000, a significant number of extreme disasters has hit this region – affecting the population and damaging assets. The region's growth is continuously threatened by disasters. A study by the Asian Development Bank (ADB) and the International Food Policy Research Institute (2009) forecasts, by 2050, a 15% decrease in irrigated rice yields in developing countries and a 12% increase in the price of rice as a result of climate change. To respond to this challenge, the Association of Southeast Asian Nations (ASEAN) has designed several policies to reduce the region's disaster losses, secure food production, and in turn protect the development gains attained.

The 2005 ASEAN Agreement on Disaster Management and Emergency Response aimed 'to provide effective mechanisms to achieve substantial reduction of disaster losses in lives and in the social, economic and environmental assets of the Parties, and to jointly respond to disaster emergencies through concerted national efforts and intensified regional and international co-operation' (ASEAN Secretariat, 2005). In 2011, ASEAN Member States adopted the ASEAN Roadmap on Disaster Risk Financing and Insurance (ASEAN Secretariat, 2011) and created a regional disaster risk financing and insurance programme (ASEAN Disaster Risk Financing and Insurance Programme, 2017) to implement the roadmap.

On food security in Asia, ADB (2011) reported a yield reduction of 14%–20% for paddy rice, 32%–44% for wheat, 2%–5% for corn, and 9%–10% for soybean. Responding to the predicted decline in food production in Asia as a result of climate change, ASEAN Member States have recognised the importance of addressing food security. The ASEAN Multi-Sectoral Framework on Climate Change: Agriculture and Forestry Towards Food Security (AFCC) was

endorsed by the ASEAN Ministers on Agriculture and Forestry in November 2009 at Bandar Seri Begawan, Brunei Darussalam (ASEAN Secretariat, 2009). ASEAN Member States also recognised the importance of mobilising investment for food security in the ASEAN Economic Community Blueprint (ASEAN Secretariat, 2015).

At the international level, the global community adopted several important agreements in 2015 including the Sendai Framework for Disaster Risk Reduction, 2015–2030; the Addis Ababa Action Agenda; the 2030 Agenda for Sustainable Development; and the Paris Agreement. All these agreements recognise the importance of resource mobilisation for action.

The United Nations (UN) outcome document of the Third UN World Conference on Disaster Risk Reduction highlights 'investing in disaster risk reduction for resilience' as one of four priorities for action (UN, 2015a), and describes expected actions at the national and local levels (para. 30) and the global and regional levels (para. 31).

The 2030 Agenda for Sustainable Development (UN, 2015c) highlights food security (Box 9.1) as one of 17 development goals.

Box 9.1: Goal 2 – End Hunger, Achieve Food Security and Improve Nutrition, and Promote Sustainable Agriculture

2.1 By 2030, end hunger and ensure access by all people, in particular the poor and people in vulnerable situations, including infants, to safe, nutritious and sufficient food all year round.

2.2 By 2030, end all forms of malnutrition, including achieving, by 2025, the internationally agreed targets on stunting and wasting in children under 5 years of age, and address the nutritional needs of adolescent girls, pregnant and lactating women and older persons.

2.3 By 2030, double the agricultural productivity and incomes of small-scale food producers, in particular women, indigenous peoples, family farmers, pastoralists and fishers, including through secure and equal access to land, other productive resources and inputs, knowledge, financial services, markets and opportunities for value addition and non-farm employment.

2.4 By 2030, ensure sustainable food production systems and implement resilient agricultural practices that increase productivity and production, that help maintain ecosystems, that strengthen capacity for adaptation to climate change, extreme weather, drought, flooding and other disasters and that progressively improve land and soil quality.

2.5 By 2020, maintain the genetic diversity of seeds, cultivated plants and farmed and domesticated animals and their related wild species, including through soundly managed and diversified seed and plant banks at the national, regional and international levels, and promote access to and fair and equitable sharing of benefits arising from the utilisation of genetic resources and associated traditional knowledge, as internationally agreed.

2.A Increase investment, including through enhanced international cooperation, in rural infrastructure, agricultural research and extension services, technology development and plant and livestock gene banks in order to enhance agricultural productive capacity in developing countries, in particular least developed countries.

2.B Correct and prevent trade restrictions and distortions in world agricultural markets, including through the parallel elimination of all forms of agricultural export subsidies and all export measures with equivalent effect, in accordance with the mandate of the Doha Development Round.

2.C Adopt measures to ensure the proper functioning of food commodity markets and their derivatives and facilitate timely access to market information, including on food reserves, in order to help limit extreme food price volatility.

Source: UN (2015c).

UN (2015b), the agreement from the Third International Conference on Financing for Development, noted:

Shocks from financial and economic crises, conflict, natural disasters and disease outbreaks spread rapidly in our highly interconnected world. Environmental degradation, climate change and other environmental risks threaten to undermine past successes and future prospects. We need to ensure that our development efforts enhance resilience in the face of these threats (para. 4).

It also stated:

We encourage consideration of climate and disaster resilience in development financing to ensure the sustainability of development results. We recognise that well-designed actions can produce multiple local and global benefits, including those related to climate change. We commit to investing in efforts to strengthen the capacity of national and local actors to manage and finance disaster risk, as part of national sustainable development strategies, and to ensure that countries can draw on international assistance when needed (para. 62).

Investment and finance are recognised as key tools in achieving those agreements. However, the role of financial institutions may be recognised just as 'money supplier'. Financial institutions have important functions in managing, mitigating, and transferring risk.

This chapter discusses the role of financial institutions and their financial instruments in relation to food security based on the following questions:

- What is the theoretical role of financial institutions in managing disaster risks?
- What sort of financial schemes will work well for disaster risk management?
- What are the pros and cons of each financial instruments and scheme?
- Is there any possible collaborative financial mechanism to manage disaster risks amongst ASEAN countries?
- What sort of policies will be recommended to attract financial institutions to use their financial schemes more effectively?

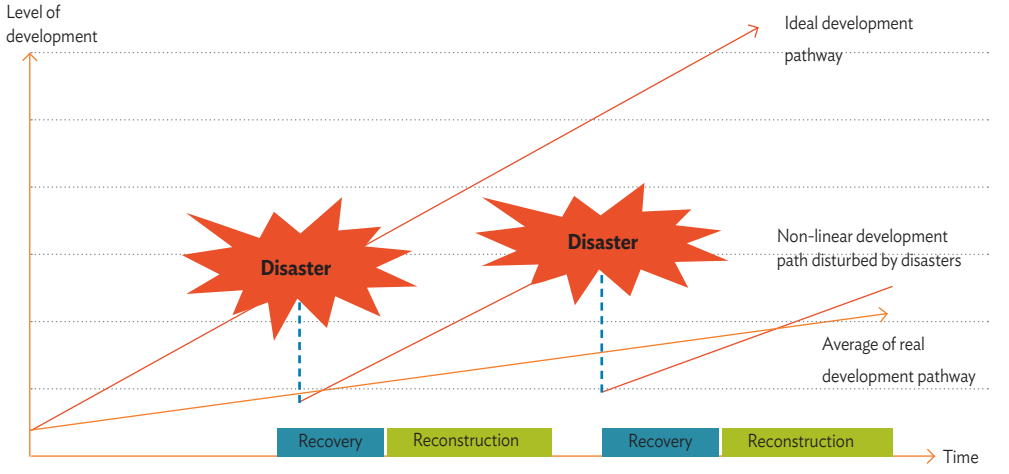
Section 2 reviews the current status and discussions on adaptation, disaster, and food security related finance. Section 3 analyses the relationship between the development pathway and disaster and food security, while section 4 discusses the theories of the role of financial institutions. These chapters provide the foundation for discussing the role of financial institutions in disaster risk management and food security. Section 5 reviews and analyses selected financial instruments and schemes. Section 6 proposes a possible collaborative financing mechanism amongst ASEAN countries. The conclusion and policy recommendations follow in Section 7.

9.2 Disasters, Food Security, and the Sustainable Development Pathway

Disaster is one of the typical barriers to development. The main purpose of development is to improve people's quality of life. To achieve this goal, policymakers try to design the best development pathway for each country. An ideal development pathway may be achieved if no external shocks occur. However, these efforts are easily disturbed by unexpected external shocks such as natural disasters.

Figure 9.1 compares the development pathway with and without external shocks such as disasters. Once a disaster occurs, many assets and capital will be lost, and many economic and social activities will be disturbed. In addition, because of the loss of assets and business and social opportunities, development may be derailed from the ideal pathway. If the impact of external shocks is limited and manageable, a derailed development pathway could be easily recovered. However, if the impact of the external shock is too large and unmanageable, it incurs a huge cost and long recovery time, making it hard to recover the ideal development path. Developing countries have particularly limited capacity to manage the risk of such large external shocks.

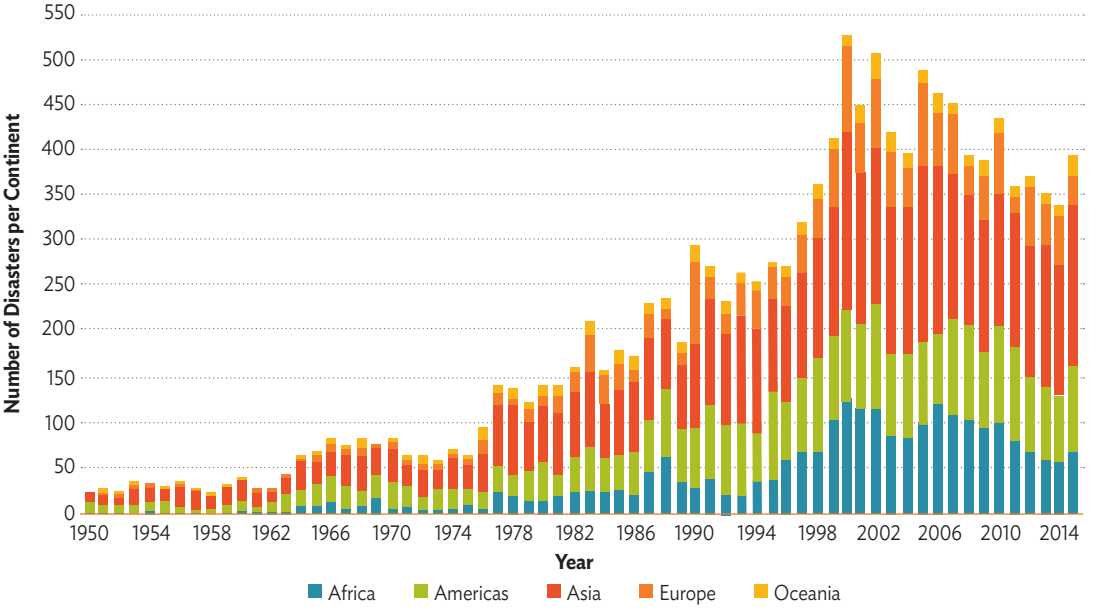
Figure 9.1: Disturbed Development Path



Source : Author.

The number of disasters is increasing. Figure 9.2 shows the rising trend in the number of disasters since 1950. According to data from the Emergency Events Database (EM-DAT), the number of disasters has increased exponentially – almost quadrupling since the early 1970s. Around 40% of the disasters occurred in the Asia and the Pacific region each year. The scale of the disasters has also strengthened, and the losses and damages caused by the natural disasters has increased.

Figure 9.2: Number of Disasters by Region, 1950–2015



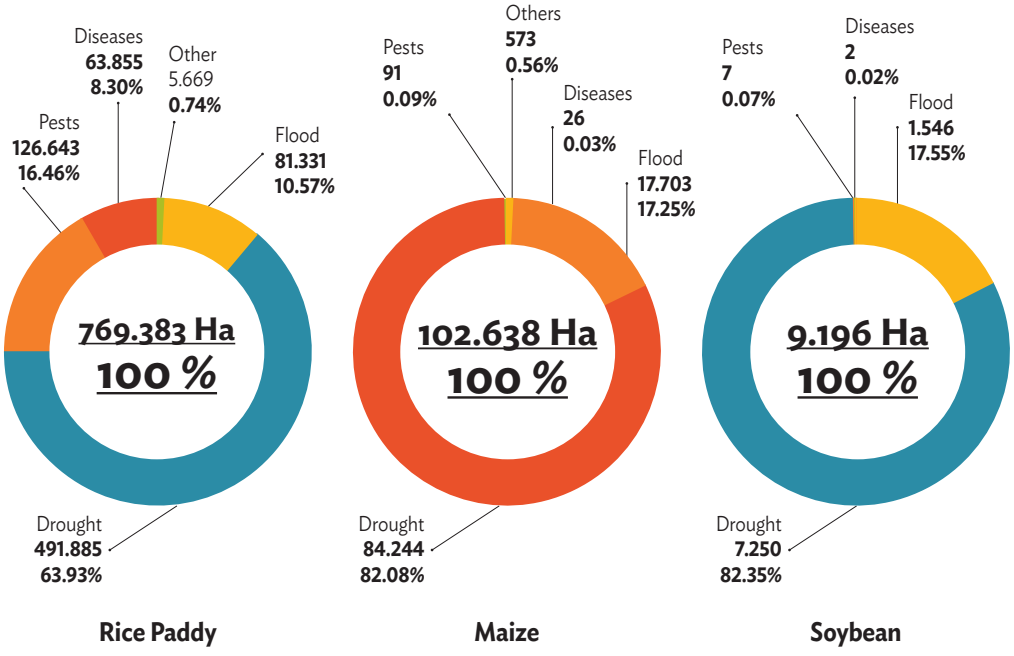
Source: Centre for Research on the Epidemiology of Disasters (2019), Emergency Events Database. www.emdat.be (accessed 10 February 2019).

In 2011, Thailand was affected by a large-scale flood. According to the World Bank and the Government of Thailand (2012), the total damage and loss amounted to THB1.43 trillion ($46.5 billion), which was more than 13% of that year's gross domestic product. The floods were estimated to reduce real gross domestic product growth in 2011 by 1.1% from pre-flood projections, cut Thailand's current account to $11.9 billion from a projected $20.6 billion, and cause a 3.7% loss in tax revenue from estimated pre-flood revenues (World Bank and Government of Thailand, 2012).

Figure 9.3 shows the damage area of major agricultural products in the ASEAN region by the cause of damage. According to these data, drought is the major event affecting the

production areas of major foods, followed by floods. In the case of rice paddy, 492,000 hectares were damaged by drought while 81,000 hectares were damaged by floods. This comprises 75% of the damaged area in crop year 2014/15 and 1.2% of the total rice paddy in the ASEAN region. In the case of maize and soybean, almost all the damage is caused by drought or floods.

Figure 9.3: Damage Area of Major Agricultural Products in ASEAN by Cause, 2015 (Crop Year 2014/15)



ASEAN = Association of Southeast Asian Nations, ha = hectare.

Source: ASEAN Food Security Information-System Office (2016).

Thus, risk management is an essential tool for development because people in developing countries are exposed to many risks, and an inability to manage those risks can jeopardise development goals, including economic growth and poverty reduction. The prevalence of risk in everyday life in the developing world is apparent in Table 9.1, which presents data from household surveys conducted by the World Bank that count the number of respondents who have been affected by various shocks. According to the World Development Report 2014 (World Bank, 2013), a majority of households across a sample of developing countries report having been exposed to a shock in the preceding year, and a substantial proportion were exposed to more than one. It also shows that the shocks most frequently reported are natural

hazards (such as droughts and floods) and health risks. Rural areas tend to be more severely affected by shocks, especially by droughts and floods.

Table 9.1: Shocks Faced by Households in Developing Countries (% of respondents reporting type of shock)

Shocks	Afghanistan[a]		India[b]	Lao PDR		Malawi		Peru		Uganda	
	Urban	Rural	Rural	Urban	Rural	Urban	Rural	Urban	Rural	Urban	Rural
One or More	16.4	48.9	61.6	34.4	72.1	40	66.8	20.7	34.4	29.7	56.2
Two or More	8.7	39.2	23.4	11.9	36.1	12.7	40.4	1.4	1.9	5.6	15.6
Natural Disasters (drought, flood)	10.6	42.2	57.3	5.6	36	10.4	47.2	2.6	21.5	19.9	52.1
Price Shocks[c]	0.2	3	-	4.4	4.9	21.1	42	-	-	1.7	3.2
Employment Shocks	6.4	43.3	-	9.3	3.1	7.7	3.4	6.4	1.5	1.9	0.7
Health Shocks (death, illness)	6.9	14	30.2	23.2	33.8	10.1	18	9.1	8.9	11.8	14.9
Personal and property crime	1.8	6.6	0.9	5.8	1.9	8.5	8.4	3.2	3.1	6.6	8.7
Family and legal disputes	-	-	1.9	0	0.9	1.7	4.3	0.7	0.3	-	-

- = not available, Lao PDR = Lao People's Democratic Republic.

[a] The 2005 Afghanistan National Risk and Vulnerability Survey aims to be statistically representative at the national level. However, to the extent that it is difficult to access the households most acutely affected by insecurity, the data may underestimate shocks for those households. Conversely, it shows that the risks faced by the households that were surveyed are not unlike those in other developing countries.

[b] Data for India are based on representative surveys from rural Karnataka, Madhya Pradesh, and Orissa.

[c] Price shocks refer to strong or unexpected changes in the price of agricultural outputs or inputs, or the price of staple food items.

Source: World Bank (2013), based on data from household surveys in various years from 2005 to 2011.

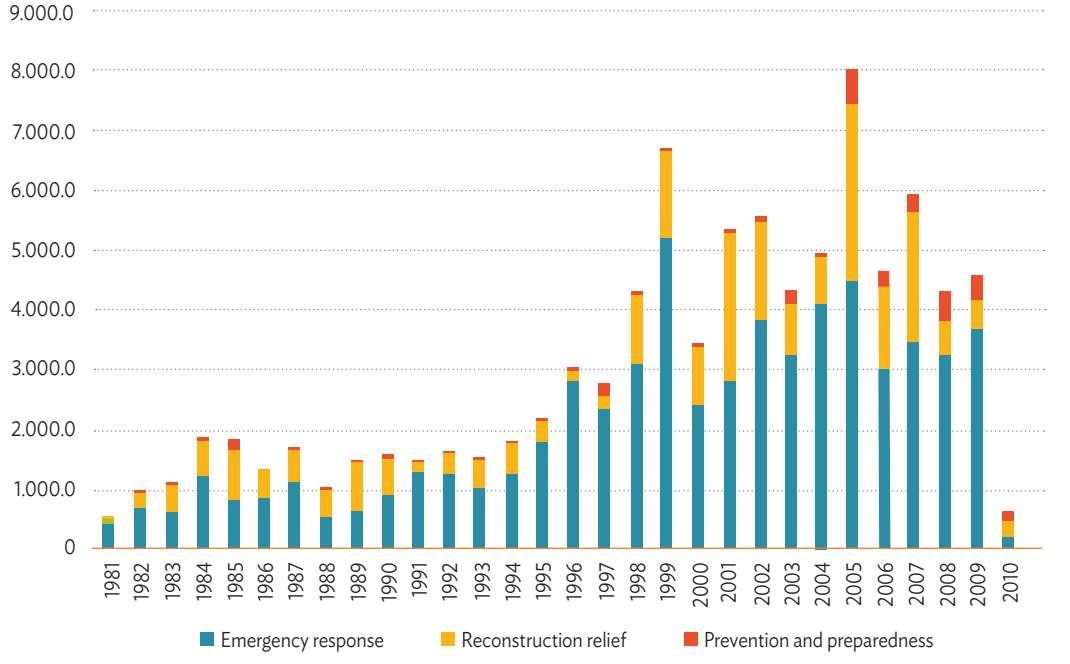
Donors provide financial assistance for disaster management. The World Bank (2013) compiled disaster-related aid commitment data over 30 years from 1981 to 2010 (Figure 9.4). This shows that most disaster-related aid is provided to emergency response (69.2%) and reconstruction relief (27.1%), while only a limited amount is provided for prevention and preparedness activities (3.7%).

Although such disaster-related aid is essential for the affected people, it can be considered an opportunity cost. If the disaster were not to happen, such aid money could be used for another development purpose, which could contribute to economic and social development.

Disaster-related aid can only cover a limited part of the direct losses and damages caused by disasters, while governments and affected people cover the remainder. Indirect losses caused by the delay in recovering from disasters and the decline in economic activities may be covered by the people affected by the disasters, which may affect the clients of businesses run by these people.

The business of financial institutions, such as domestic commercial banks, may also be affected by disasters. The most direct impact on financial institutions is damage to their premises (headquarters and branches) and employees. Nevertheless, they should continue to provide financial services to their clients, who need cash for emergency and recovery purposes.

Figure 9.4: Disaster-Related Aid Commitments



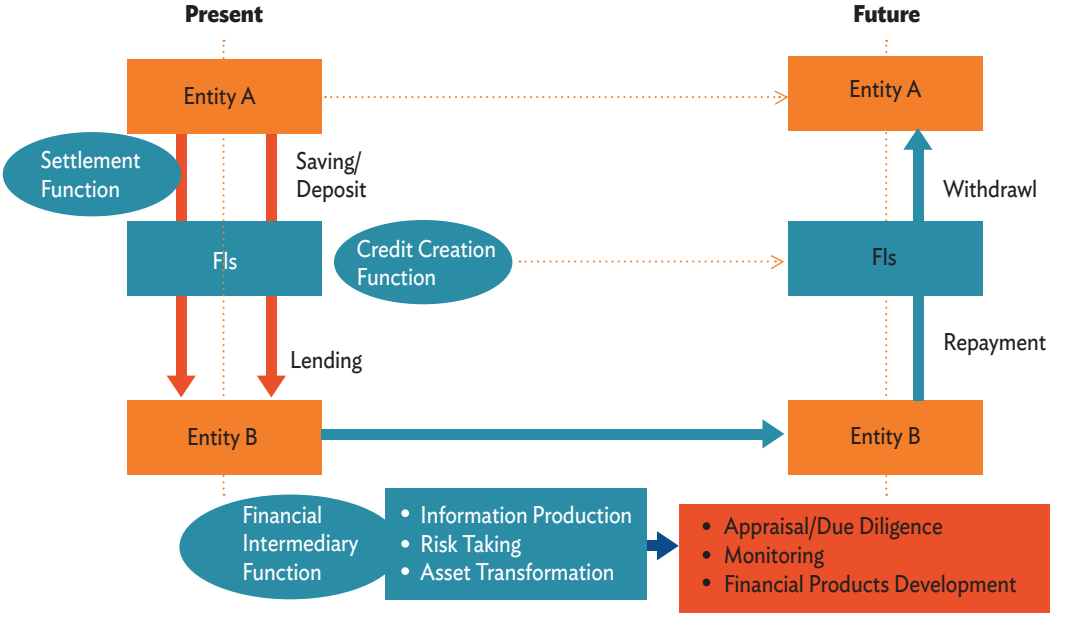
Source: World Bank (2013).

9.3 Roles of Financial Institutions

9.3.1 Functions of Financial Institutions in Theory

We start our discussion on the role of financial institutions in disaster risk management by reviewing the functions of financial institutions. Some finance and banking textbooks[1] identify several key functions of financial institutions, such as (i) the settlement function, (ii) the credit creation function, and (iii) the financial intermediary function. Figure 9.5 shows the relationship between stakeholders and financial institutions, and the functions which support transactions between stakeholders.

Figure 9.5: Key Functions of Financial Institutions



FI = Financial Institutions.

Source: Author.

[1] For example, see Bodie, Merton, and Cleeton (2012); Cecchetti and Schoenholtz (2016); Miller and VanHoose (2000); and Mishkin (2016).

Settlement Function

The settlement function is the simplest but most fundamental function of financial institutions. Settlement is the business process of payment of money for the delivery of goods and services between two parties. Although buyers can pay sellers for goods and/or services in cash, this involves a risk (delivery risk) and a cost for payment. For cross-border trade, in particular, buyers may not be able to deliver cash because of government cash control policies. Thus, settlement is considered a key function of financial institutions.

Credit Creation Function

As various studies have noted, another important function of a financial institution is the creation of credit.[2] Financial institutions create credit by advancing loans, purchasing securities, and/or investing in projects. They lend money to or invest in individuals and businesses from customers' deposits. However, commercial banks cannot use the entire amount of public deposits for lending purposes. They are required to keep a certain amount as a reserve with the central bank to serve the cash requirements of depositors, but can lend the remaining portion of public deposits to customers. Borrowers deposit their borrowed cash in the banks, and the banks can lend the deposits once the reserve portion has been covered. By continuing these transactions, the commercial banks can generate 'credit money'.

Financial Intermediary Function

The financial intermediary function is the most important function of financial institutions. It allows us to reallocate the uninvested or inactive capital to productive actors to generate additional value. Where a commercial bank serves as a financial intermediary, the commercial bank receives deposits from households (entity A in Figure 9.5) and lends money to companies (entity B). If there is no financial intermediary function, households may store the money at home or find a company that will accept a small amount of borrowing from households. Companies need to borrow a small amount of money from a lot of households to invest in the construction of new factories and other physical assets. This could be a costly transaction for both entities. Further, since households may face difficulty in collecting information on the company that will borrow their money, they should take a default risk of borrower. This is one of the risks for households as lenders because of the information asymmetry. Unlike the other functions, the financial intermediary function covers uncertainty over time, since the borrower may go bankrupt and not be able to continue their repayments

[2] For example, see McLeay, Radia, and Thomas (2014); and Federal Reserve Bank of Chicago (2015).

and interest payments during the repayment period. So, the financial institutions should assess the borrowers on their credibility and monitor them during the repayment period. Thus, the financial institution as a financial intermediary plays an important role in connecting these entities, and reducing the risks and costs associated with financial transactions for both sides. From the financial intermediation function, we can identify three key roles for financial institutions as financial intermediaries: (i) asset transformation, (ii) information production, and (iii) risk taking and/or transfer.

(i) Asset Transformation

As noted above, financial institutions such as commercial banks receive deposits from one entity (surplus units) and lend money to another entity (deficit units). In financial terms, receiving deposits is considered an issue of indirect securities and lending is considered an acceptance of prime (or direct) securities – i.e. the financial institutions transform the different types of assets. Through this asset transformation, financial institutions can collect money from many clients who hold a surplus of money and distribute it to other clients who need money for investment. This means the financial institutions will reallocate money by transforming assets.

(ii) Information Production

When financial institutions lend to borrowers, they appraise them to reduce the risk of default. They try to collect and analyse information on the borrowers to decide whether they can lend to them. To minimise the information asymmetry, financial institutions try to collect as much information as possible and carefully analyse it to decide the terms and conditions of the loan. If necessary, the financial institutions ask the borrower to provide collateral to cover the remaining risk. The financial institutions also monitor the borrowers since the business of the borrowers varies over time because of changes in the economic and social environment. Thus, the financial institutions produce information on the borrower through this appraisal/due diligence and monitoring process.

(iii) Risk Taking and/or Transfer

Financial institutions identify and analyse the risks associated with loan operations through the appraisal and due diligence process, and decide whether they can manage such risks by absorbing them within their portfolio and/or transferring the risks to others. Such risk management is another function of financial institutions, which develop financial products to help clients manage risks by using financial engineering techniques. Some of the

financial products are already used as financial mechanisms for adaptation and disaster risk management. Further details of such financial mechanisms are discussed in section 4.

9.3.2 Using Functions of Financial Institutions for Adaptation, Disaster Risk Management, and Food Security

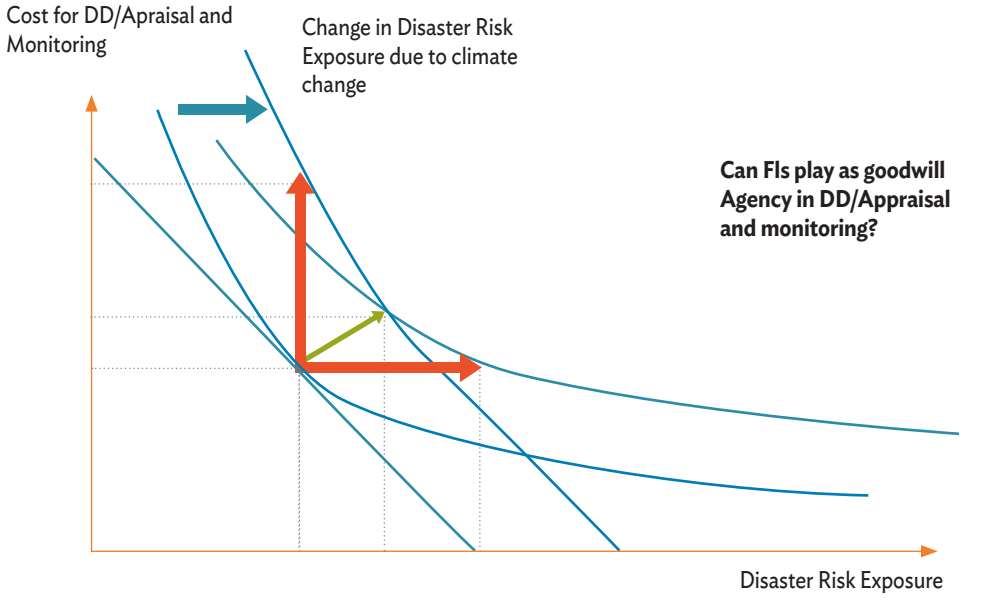
Financial institutions may be able to use the above-mentioned functions for adaptation and disaster risk management. However, a crucial issue is whether the financial institutions recognise climate change related natural disasters as risk, and whether they can identify the level of vulnerability against natural disasters.

Financial institutions assume a variety of risks, including natural disasters. However, nobody – including financial institutions – knows when, where, or how many extreme natural disasters will occur. Therefore, financial institutions also need to prepare for severe natural disasters.

Financial institutions generally prepare for their own damages, such as the loss of physical and human assets, system errors, and loss of profits caused by market confusion. If they try to reflect the disaster risks their clients will face, they need to consider the balance between the appraisal and/or due diligence cost and the expected natural disaster risk exposure.

Figure 9.6 shows the relationship between the appraisal/due diligence cost and the disaster risk exposure of financial institutions. We are facing a general risk of disasters. Most weather events will not cause serious damage, however, and the extreme weather events which cause severe damage rarely occur. The scale of such damage depends on the social and economic conditions as well as the severity of the disasters. If financial institutions reflect the disaster risk exposure in their appraisal and/or due diligence, the appraisal and due diligence cost will increase. If financial institutions make a more precise analysis, the disaster risk exposure will decrease but the cost for the appraisal/due diligence will increase. Thus, the relationship between the cost for the appraisal/due diligence and the disaster risk exposure will be inversely proportional.

Figure 9.6: Change of Cost and Risks, and Behaviour of Financial Institutions



DD = Detailed Design.

Source: Author.

Financial institutions may try to find an optimal balance between the expected disaster risk exposure and the appraisal cost, based on their unique sensitivity. In Figure 9.6, a straight line shows a financial institution's sensitivity against the cost. The slope of the line will vary, depending on each financial institution's sensitivity to disaster risk exposure. A point of contact will be an optimal balance between the cost for the appraisal or due diligence and the disaster risk exposure of a financial institution.

However, the risk of disaster will vary because of climate change. Severe disasters will occur more frequently and the probability of extreme disasters will rise – increasing the expected disaster risk exposure. In this case, the curve in Figure 9.6 will shift to the right. If the curve shifts, financial institutions should seek a new optimal point of contact to balance the cost of the appraisal/due diligence and the disaster risk exposure. If financial institutions ignore the change in the frequency and severity of natural disasters, the loss they incur through exposure to disasters will increase.

Thus, financial institutions should be sensitive to the change in disaster risks caused by climate change. They should reflect this change in their appraisal and due diligence by

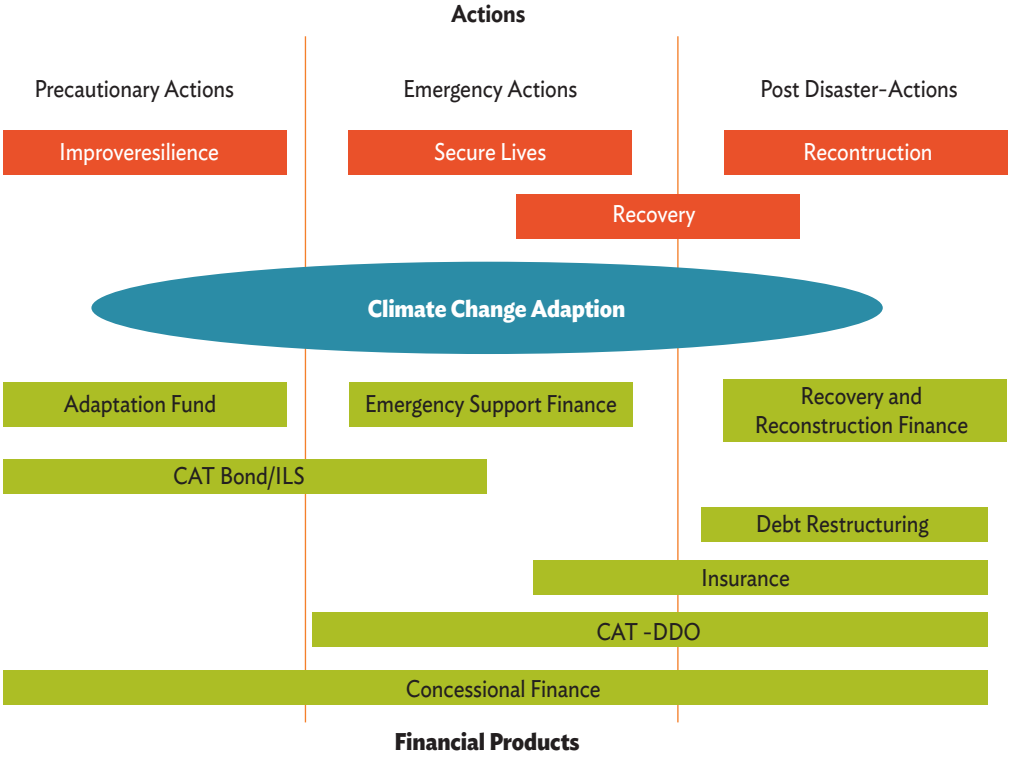
using their information production and risk management functions, and allocate funds for precautionary and post-disaster activities.

9.4 Financial Instruments for Disaster Risk Management and Food Security

9.4.1 What Sort of Financial Instruments are Available?

Some financial institutions have developed financial products to cope with disasters and food security. In this section, we identify financial instruments for coping with disasters and food production volatility, and categorise them by the stage of the events. Figure 9.7 categorises selected financial instruments for coping with disasters into three stages: precautionary, emergency, and post-disaster. The respective stages differ in terms of uncertainty and the terms and conditions of finance.

Figure 9.7: Financial Instruments for Disaster Risk Management and Food Security by Stage of Action



CAT = catastrophe, CAT-DDO = Catastrophe Deferred Drawdown Option, ILS = insurance-linked securities.

Source: Author.

Financial Instruments for Precautinary Actions

Precautionary actions are defined as actions to prepare for and strengthen resilience to extreme weather events. At this stage, nobody knows when the disasters will occur or how large the extreme weather events will be, i.e. the scale of the disaster is uncertain.

Given this uncertainty, project and programme managers raise finance based on the design and financial requirements of their own projects and programmes. At the design stage of the project and programme, the manager may incorporate disaster risks into their consideration through sensitivity analysis. In this sense, the financial instruments to be used for those projects and programmes may be general project finance.

If the project or programme is sensitive to disaster risk, their managers may select the catastrophe (CAT) bond to minimise (or transfer) the risk of default caused by disaster-induced damage. CAT bonds are discussed further in section 9.4.2.

The public sector provides services to help citizens cope with disasters – precautionary actions such as preparing evacuation centres, food stocks, and early warning systems – using its own budget. Other external funds such as the Adaptation Fund (2017) and concessional finance from donor countries and international development finance institutions is also available to support precautionary actions.

Financial Instruments for Emergency Response

Emergency response is defined as actions to secure the lives of people affected by disasters; quick repair of lifeline utilities; and the provision of evacuation centres, temporary housing, and related works for affected people. Most of these activities are temporary, but the costs and resources needed are huge. Therefore, quick disbursement and/or payment are crucial to cover the costs.

The public sector generally has contingency funds for emergencies. However, since the scale of disasters is uncertain, the contingency budget is not necessarily able to cover the whole cost of emergency actions. In such cases, local governments at the site of disasters request financial and human resources support from the central government since the local government officials may be affected by the disaster. Thus, mutual support is essential during

emergencies. In the case of huge-scale disasters, where even the central government cannot cover emergency costs, the governments of other countries may provide emergency services including financial and human resources support.

Other financial instruments are helpful for emergency purposes. Insurance is a traditional and well-known instrument for emergencies. Once disaster occurs, an insurance payout is made based on the terms and conditions of the policy. However, in most cases, the payout is based on the damage assessment, which often takes time, and recipients may receive the insurance payout at the recovery stage rather than during the emergency. In some cases, insurance companies pay a lump sum as part of the payout to meet the needs of policyholders.

Another financial instrument that is helpful for emergency actions is the Catastrophe Deferred Drawdown Option (CAT-DDO), which is a type of credit line scheme used only for emergencies when affected people and governments need cash urgently. Disbursement from the CAT-DDO is made quickly when the triggering requirement is satisfied. Details of the CAT-DDO are discussed in section 9.4.2.

As noted in the previous section, CAT bonds ease the pressure of redemption and coupon payments for issuers, since the CAT bond is issued with a condition, e.g. the bond will be invalid if the assumed scale of disaster (trigger) happens. This eases the bond issuers' cash flow in an emergency, allowing them to use the cash prepared for redemption and/or coupon payments for emergency purposes.

Financial Instruments for Post-Disaster Actions

Post-disaster actions are defined as actions to recover from damage and reconstruct affected peoples' lives. Recovery and reconstruction efforts can take years to complete, where disasters cause severe damage, and the cost is huge. Large-scale disasters inflict damage not only on physical infrastructure but also soft infrastructure such as social systems and institutions. The level of economic activity declines during the emergency and post-disaster stage because of damage to assets, systems, and institutions. Disasters may also reduce the fiscal budget for governments because of the decline in tax revenue and the need to provide additional funds to financial institutions as a result of increased withdrawals from their customers. Even if disasters damage the social system and institutions, governments

need to retain stable fiscal and financial management. To fulfil the financial liquidity gap for governments, concessional finance from donors is helpful.

On the other hand, affected people whose assets are lost or damaged face further problems since the value of any assets that they have used as collateral may be lost or reduced along with the assets. So, although these people need additional funds from financial institutions, they have limited financial capacity to borrow new money from them. In addition, some may be existing borrowers, liable to repay the outstanding amount of loans and interest payments. Thus, people affected by disasters face complex financial difficulties.

During the recovery period of the Great East Japan Earthquake, the Ministry of Finance of Japan took special measures for local governments in disaster areas (Box 9.2).

Box 9.2: Special Measures for Local Governments in Disaster Areas

The following special measures were taken for local governments affected by the Great East Japan Earthquake.

1. **Substantial exemption of interest which is overdue because of disaster**
   To deduct the amount of overdue interest from future interest payment amounts, the loan terms were changed (interest rate reduction).

2. **Special measures for loan procedures**
   To reduce the administrative burden on affected organisations and enable smooth borrowing, measures were taken such as simplifying procedures and extending deadlines.

3. **Extension of redemption deadlines**
   To reduce the burden of the single fiscal year expenses of local government bonds on affected organisations, the redemption deadlines of disaster recovery project bonds, amongst others, were extended.

4. **Exemption from forcible pre-maturity redemption for facilities destroyed by disaster**
   If a local government does not restore burned or destroyed facilities, a pre-maturity redemption can be demanded from the local government. However, to support the recovery of disaster areas, considering the fiscal situation of affected governments, pre-maturity redemption shall not be demanded in principle.

Source: Ministry of Finance, Japan (2011).

Fukuda (2014) reviewed the function of local finance in the recovery process after the Great East Japan Earthquake, and highlighted the importance of the role of local financial institutions in supporting local companies damaged by the disaster – to ensure business continuity and recovery of profit levels, and to assess and provide financial support to new industries and businesses emerging during the recovery.

Thus, at the post-disaster stage, the provision of additional financial liquidity and financial restructuring are effective ways to relax the pressure of financial obligations on the affected people and to cover the cost of restarting their businesses and/or lives as soon as possible to minimise economic losses. Concessional finance, whether general budget support or project-based finance from donors, is helpful for countries that need additional liquidity. Insurance is the traditional financial instrument to cover the damage cost resulting from disasters. Once insurance claims are settled, policyholders receive payouts to help reconstruct their lives. The CAT-DDO has a similar effect to the insurance scheme in terms of liquidity support. Including the CAT bond can work effectively to restructure the debt portfolio, as the CAT bond is cancelled if the scale of the disaster exceeds the trigger of the cancellation condition.

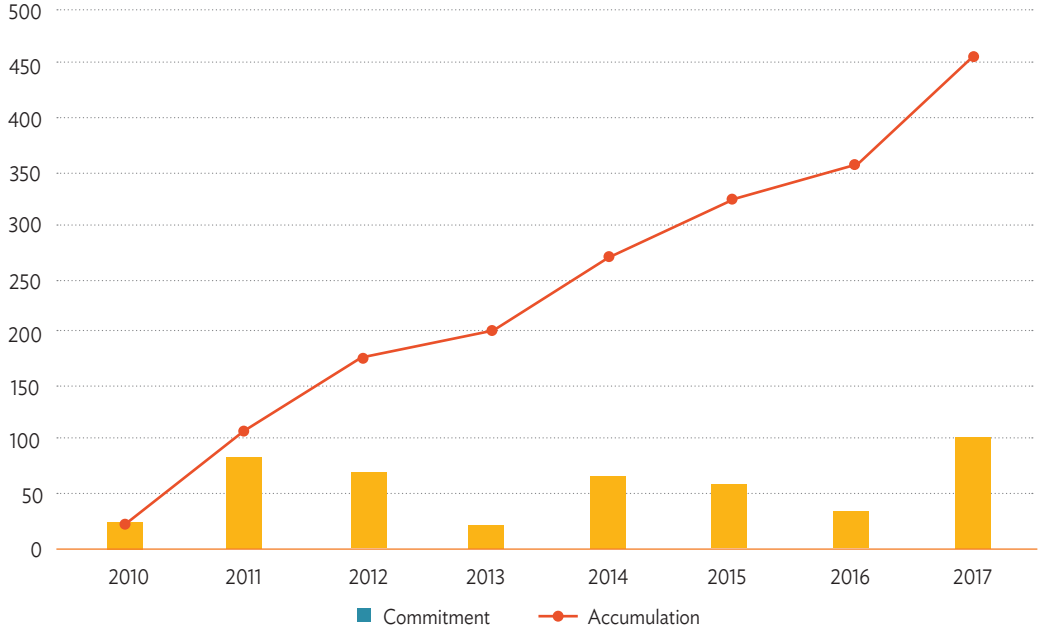
9.4.2 How the Financial Instruments Work

In this section, we review some of the financial instruments for coping with disaster-related actions. As discussed in the previous section, several financial instruments support disaster-related actions. Amongst others, we highlight the Adaptation Fund, the CAT bond, and the CAT-DDO.

Adaptation Fund

The Adaptation Fund is one of the financial mechanisms established under the Kyoto Protocol of the UN Framework Convention on Climate Change. The objective of the Adaptation Fund is to finance concrete adaptation projects and programmes in developing countries, particularly in countries vulnerable to the adverse impacts of climate change. As of September 2017, the Adaptation Fund had committed about $461 million to 95 projects. Annual commitments and the accumulated commitment amounts are shown in Figure 9.8. The average size of the 95 projects was $4.9 million, and that of projects, except readiness grants, is $6.6 million. About $171 million of the total commitments (37.2%) had been disbursed by September 2017.

Figure 9.8: Annual and Accumulated Commitment by Adaptation Fund ($ million)

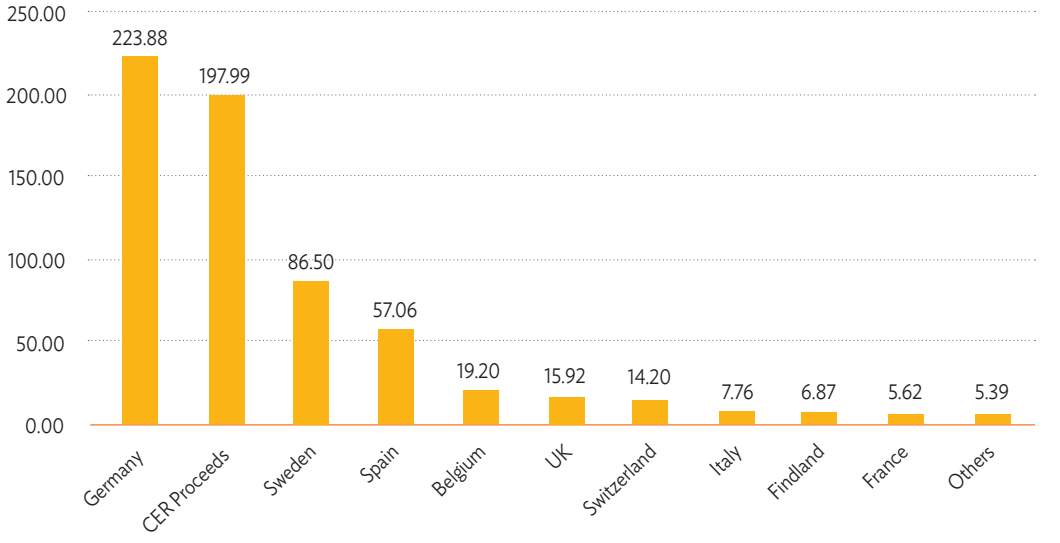


Source: Adaptation Fund (2017a).

The Adaptation Fund was originally designed to be financed from a 2% share of the proceeds of certified emission reductions (CERs) issued for Clean Development Mechanism projects. The fund now receives contributions from public and private donors. The World Bank, as a trustee of the fund, reports its financial status (Adaptation Fund (2017b)). Figure 9.9 shows

the receipt of funds by resources. As of 30 September 2017, the Adaptation Fund had received $197.99 million from CER proceeds and $442.40 million as donors' contributions. The contributions from donors were more than double the share of the CER proceeds. Germany was the top donor, followed by Sweden, Spain, Belgium, and the United Kingdom.

Figure 9.9: Receipt of Funds by Resources ($ million)



CER = Certified Emission Reduction, UK = United Kingdom.

Source: World Bank (2017).

Considering the financial need and compared with other sources of funding for adaptation, the Adaptation Fund contributes quite a limited share, even though it is one of the key financial mechanisms under the UN Framework Convention on Climate Change (UNFCCC). Trujillo and Nakhooda (2013) reviewed the Adaptation Fund and pointed out that 'the operationalisation of the Adaptation Fund has played an important role in scaling up available finance for adaptation in developing countries, albeit from a very low baseline' (Trujillo and Nakhooda (2013: 28). They evaluated the role of the Adaptation Fund: 'it has developed a functional system for delivering adaptation finance that meets high levels of transparency, and has important provisions for accountability and learning' (Trujillo and Nakhooda, 2013: 28).

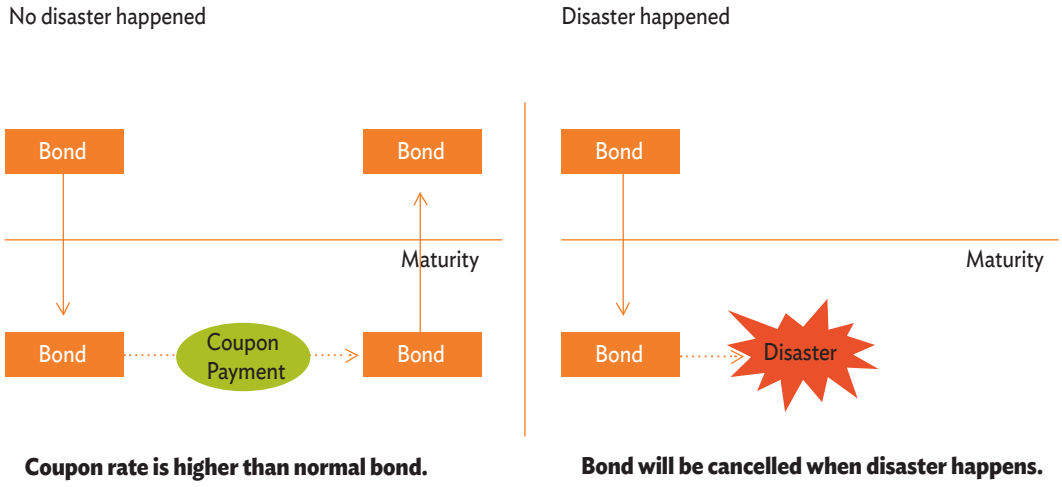
Although the Adaptation Fund plays an important role, it only covers the cost of precautionary actions against climate change – mainly supporting capacity development for adaptation planning – because of its limited scale.

CAT Bond

The CAT bond is a disaster risk-linked security that transfers the risk of damage caused by disasters from a bond issuer to investors. If no disaster occurs, the bond issuer pays a coupon to the investors. Once trigger conditions (such as the occurrence of a large-scale disaster) are met, the principal is forgiven. Figure 9.10 illustrates how the CAT bond works.

CAT bonds are typically used by insurers as an alternative to traditional catastrophe reinsurance. Therefore, the CAT bond is considered one of the insurance-linked securities (ILS).

Figure 9.10: Catastrophe Bond Scheme



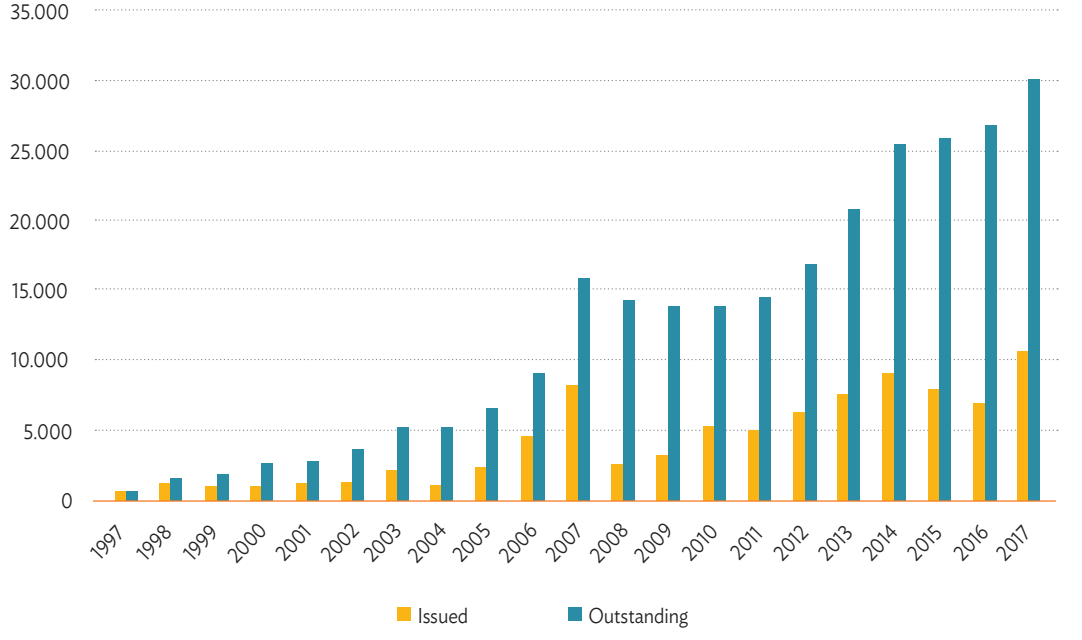
Source: Author.

Since the CAT bond is considered a high-risk security, its coupon rate is higher than normal bonds issued by the same issuer with identical maturity – reflecting the default risk of the bond being triggered by catastrophic disaster.

Although the issuer of the bond should pay a higher coupon rate, they are released from repayment of the principal and the bond when triggered. This helps bond issuers to secure finance for recovery and reconstruction, while investors receive higher returns if no disaster occurs. Sudo (2008) analysed the effectiveness of the CAT bond as a tool to share the disaster risk in the market; and found the potential of CAT bonds to apply to fund-raising not only by insurance companies but also commercial companies as part of their debt portfolio.

Figure 9.11 shows the CAT bond and ILS risk capital issuance and the outstanding amount of capital from 1997 to 2017 based on Artemis (2017). According to these figures, the issuance of the CAT bond and ILS increased gradually from 1997, with the largest issuance in 2007, before declining drastically in 2008. Issuance gradually recovered and reached a historic peak by the third quarter of 2017. Reflecting this trend, the outstanding total amount of capital of the CAT bond and ILS also increased, reaching around $30 billion by the third quarter of 2017.

Figure 9.11: CAT Bond and ILS Risk Capital Issued and Outstanding, 1997-2017 ($ million)



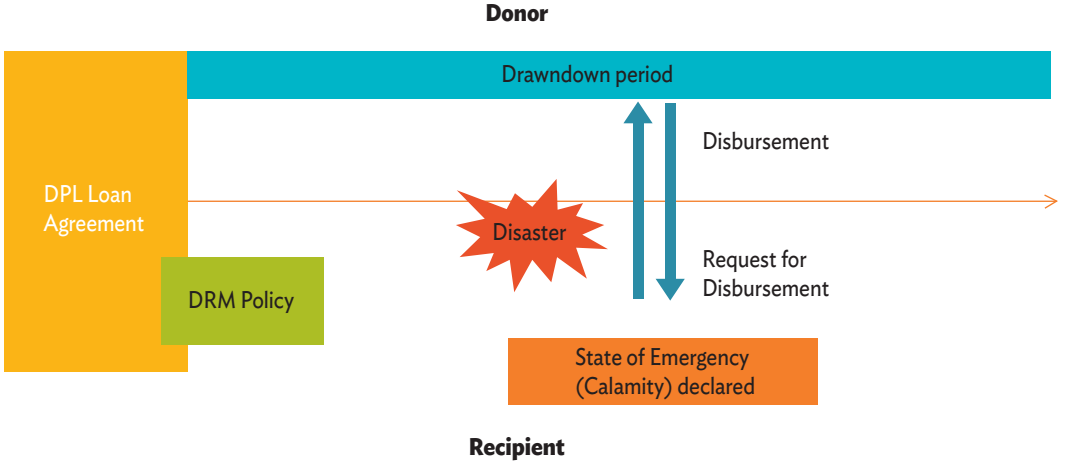
CAT = catastrophe, ILS = insurance-linked securities.

Source: Artemis (2019), Catastrophe Bonds and ILS Issued and Outstanding by Year.
http://www.artemis.bm/deal_directory/cat_bonds_ils_issued_outstanding.html (accessed 1 March 2019).

Development Policy Loan with a CAT-DDO

The CAT-DDO is an application of the Development Policy Loan (DPL) with a drawdown option, which was developed by the World Bank (2011a). The DPL is one of the lending schemes to support the fiscal budget of developing country governments. Under the DPL, donors and recipient countries agree to a list of actions for specific policy purposes when the loan agreement is concluded. Both donors and recipient countries monitor the progress of the actions on the list, and disbursements are made when the targeted actions are implemented. Figure 9.12 shows how the CAT-DDO works. The scheme of the CAT-DDO is almost the same as the DPL. The difference between the DPL and the CAT-DDO is whether the trigger for disbursement is placed or not. In the CAT-DDO, the policy matrix is formulated as a list of policy actions related to disaster risk management. Once the policy actions are completed, the drawdown option is enacted, i.e. once the trigger event occurs, disbursement is made.

Figure 9.12: CAT-DDO Transaction



CAT-DDO = Catastrophe Deferred Drawdown Option, DPL = Development Policy Loan, DRM = disaster risk management.
Source: Author.

The World Bank provided a CAT-DDO to the Philippines in 2011. The objective of the project was to enhance the capacity of the Government of the Philippines to manage the impacts of natural disasters. This objective was achieved by supporting the following aspects of the government's disaster risk reduction and management framework: strengthen the institutional capacity for disaster risk management efforts, mainstream disaster risk reduction

measures into development, and better manage the government's fiscal exposure to natural disaster impacts. The World Bank explained that 'The Cat DDO allows governments to respond quickly to emergency needs without diverting resources from important long-term development projects. The product is typically used to finance liquidity gaps in the government budget for countries exposed to natural disasters. It is triggered by a Presidential Declaration of a State of Calamity' (World Bank, 2011b). The triggering disaster, Tropical cyclone Sendon (Washi), occurred in December 2011. The Government of the Philippines declared a state of calamity and the World Bank quickly disbursed $500 million from the DPL. Thus, the CAT-DDO works as a contingency line of credit, which provides emergency liquidity to cope with extreme disasters.

Traditional Insurance Scheme

Insurance is a traditional means of protection from financial loss. In 2016, Asia suffered higher economic losses because of natural and man-made catastrophes than any other region of the world. Swiss Re (2017) reported that economic losses from disaster events in Asia totalled an estimated $83 billion in 2016, of which about $9 billion were covered by insurance. This included the damage caused by the magnitude 7.0 earthquake in Kyushu, Japan, in April. Economic losses from this earthquake were estimated to be $25 billion–$30 billion, of which $4.9 billion were insured. Of the remaining $53 billion–$58 billion of economic losses in the region, $4.1 billion were covered by insurance – i.e. less than 10% of the economic losses caused by disaster were insured in the rest of the Asian region.

The traditional insurance scheme presents a number of problems, including adverse selection, moral hazard, information asymmetry, and high transaction costs such as monitoring and administrative costs in developing countries. Further, Nakata (2015) noted that insurance for natural disasters is not common practice since the occurrence of a catastrophe typically incurs a macro risk, invalidating the application of the strong law of large numbers on which a typical insurance mechanism is based. Nakata et al. (2010) showed that the diverse probability belief would be inevitable, which in turn results in weak demand for catastrophe insurance. Chantarat et al. (2015) pointed out that, without an effective insurance market, public disaster assistance and highly subsidised public insurance programmes have been the main supports for the affected population.

For agriculture, crop insurance protects against crop loss resulting from natural disasters. In the United States, a subsidised multi-peril federal insurance programme, administered by the Risk Management Agency, is available to most farmers. Some 551 types of crops are covered under this scheme. The United States Department of Agriculture (USDA, 2017) reported that more than $3.4 billion in indemnities were paid in 2017 (as of 21 December 2017). Pierro and Desai (2009: 2) noted that 'traditional crop insurance has been seen as a poor model for export, particularly in developing countries, most of which are under serious fiscal constraints and have smallholder economies suffering from high exposure to covariate risk, the risk of simultaneous losses from a single event'.

The traditional insurance scheme is a mature and reliable risk management scheme which covers economic losses caused by disasters. However, the settlement of insurance claims may be delayed since damage assessment by insurance companies takes a long time. This slows down the recovery of affected people, causing additional economic losses. Therefore, some insurance companies allow partial payments to the insured as part of insurance claims so that the insured may use it for emergency recovery.

Index-Based Insurance

Index-based insurance is an alternative to traditional insurance. It provides financial protection based on the performance of a specific index in relation to a specific trigger. Unlike traditional insurance, contracts for index-based insurance are written on an objective index (e.g. precipitation, temperature) which works as a proxy for crop losses. Therefore, under index-based insurance, insured farmers' actual losses are not needed to determine an insurance claim. This can drastically reduce transaction costs and time for damage assessments.

Pierro and Desai (2009) described case studies of index-based insurance in selected countries. Some international organisations (e.g. World Bank, 2011c; International Fund for Agricultural Development and World Food Programme, 2011) compiled information on the creation of a weather index insurance scheme based on their experience in several countries. Chantarat et al. (2015) discussed the index-based insurance scheme as an attractive means to address traditional insurance imperfections, with a case study on index-based insurance for rice farmers in Thailand.

The Bank for Agriculture and Agricultural Co-operatives of Thailand, in collaboration with the World Bank and Japan Bank for International Cooperation, introduced a weather index-based insurance pilot scheme for maize and rice. According to Yimlamai (2010), the pilot weather index-based insurance for maize with the World Bank started in 2006 in Nakorn Ratchasima Province with 110 farmers (1,970 acres). This pilot project was expanded to seven provinces (Nakhon Ratchasima, Saraburi, Lopburi, Nakhon Sawan, Phetchabun, Pitsanulok, and Nan) with the participation of 2,535 farmers. The index was developed based on the growing pattern and water requirements of maize.

Since these were pilot schemes, the coverage of the number of insured farmers was limited. In addition, index-based insurance faces a basis risk – the difference between the payout as measured by the index and the actual loss incurred by the farmer. This may cause losses for farmers and, in turn, loss of trust in this scheme.

9.4.3 Pros and Cons of Disaster-Related Financial Instruments

Several different financial instruments may be used to cope with large-scale natural disasters and climate change adaptation. However, their applicability depends on the purpose, stage, scale of finance, and beneficiaries. Policymakers do not necessarily fully understand financial instruments, leading to misunderstandings and/or misuse. To facilitate understanding of the differences between financial instruments for disaster management and climate change adaptation, Tables 9.2 and 9.3 show the pros and cons of the respective financial instruments.

Table 9.2: Pros and Cons of Financial Instruments (for Precautionary Actions)

Financial instrument	Pros	Cons
Adaptation Fund	• Clear objective of the fund • Useful for capacity development in adaptation	Limited amount of fund
Climate-Proof Financing	• Supporting disaster-resilient infrastructure	Difficulties in finding appropriate level of resilience and cost
CAT Bond	• Debt service will be cancelled or reduced when disaster happens	Higher financial costs

CAT Bond = catastrophe bond.

Source: Author.

Table 9.3: Pros and Cons of Financial Instruments (for Post-Disaster Actions)

Financial instrument	Pros	Cons
Emergency grant assistance	• Cost-free and additional finance	• Uncertainty regarding amount to be received (depends on donor's efforts
CAT-DDO	• Quick disbursement • Supporting emergency liquidity	• Limited cases • Uncertainty for finance provider in disbursement (monetary cost for preparing to disburse)
Insurance	• Traditional and established scheme • Partial payment will be given as a part of insurance claims	• Insurance does not necessarily suit large-scale disaster • Adverse selection, moral hazard, information asymmetry, and high transaction cost • Long time for damage assessment and delay in settlement of the claims
Index-based insurance	• Reduce inefficiency of traditional insurance such as adverse selection, moral hazard, information asymmetry, and high transaction cost • Quickly settled once triggers are hit	• Data availability – difficulty in setting appropriate triggers • Basis risk – difference between the payout as measured by the index and the actual loss incurred by the farmer

CAT-DDO = Catastrophe Deferred Drawdown Option.

Source: Author.

These tables show that no single instrument can cover all purposes for disaster management and climate change adaptation at any stage. This means that knowledge of the appropriate choice or combination of financial instruments and their usage is indispensable for policymakers.

9.5 Possible Collaborative Financial Mechanism amongst ASEAN Countries

As discussed in the previous sections, financial institutions are expected to play an important role and several financial instruments are expected to be available in managing the risks associated with natural disasters and climate change adaptation. However, financial institutions do not necessarily play such a role properly, and the financial instruments do not work as expected, particularly in developing countries.

The World Bank (2012) studied the state of disaster risk financing and insurance in ASEAN countries and pointed out that inadequate disaster financing arrangements had exacerbated the adverse socio-economic consequences of disasters. It made five key recommendations to support and encourage further development of disaster risk financing and insurance in ASEAN countries (Box 9.3).

Box 9.3: Steps in Developing Disaster Risk Financing Schemes

1. Develop risk information and modelling systems to assess the economic and fiscal impacts of natural disasters
2. Develop national disaster risk financing and insurance strategies at the national and subnational levels
3. Establish national disaster funds
4. Promote private catastrophe risk insurance markets
5. Strengthen regional cooperation on disaster risk financing and insurance

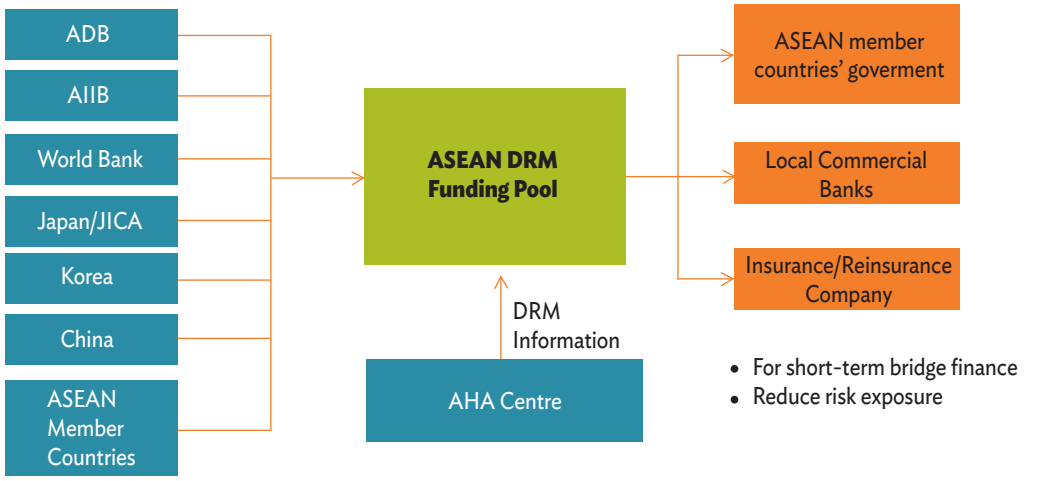
Source: World Bank (2012).

In managing the risks associated with natural disasters and climate change adaptation, information on disasters and climate change is critical for financial institutions. Such information is also indispensable for the selection of appropriate existing financial instruments as well as developing new ones. However, financial institutions do not necessarily have enough capacity to collect and handle such disaster-related information properly. Further, the volume and quality of information on disasters may vary amongst financial institutions. As a result of such asymmetry of information amongst stakeholders, financial institutions and their clients will not take collective actions on disaster risk management. Supporting financial institutions' disaster and climate change risk management would benefit not only financial institutions but also their clients, including the government and the population. In addition, since the scale of disasters and their damages are increasing, some will affect multiple areas and countries without regard to borders. In these cases, a single financial institution and/or country will not be able to manage the damage. Therefore, a regional financial mechanism should address such problems to cope with disasters.

One of the mechanisms for supporting natural disaster risk sharing and management and finance is to establish a common pool of finance and information for coping with disasters and climate change. At the 2nd Meeting of the ASEAN Cross-Sectoral Coordination Committee on Disaster Risk Financing and Insurance (DRFI) held on 8 February 2017 in Davao, the Philippines, participants exchanged views on the next phase of the ASEAN DRFI Roadmap and Programme, which will focus on the considerations and preconditions for establishing a regional risk insurance pool in the region (ASEAN Secretariat, 2017).

Figure 9.13 shows an example of a funding pool mechanism, developed based on the proposal made by Sudo (2015; 2016). Although both proposals highlight the role of the financial pool as leverage to finance climate change mitigation actions, those could be applicable in this field since the leveraging effect through pool funding will be effective in mobilising finance from a variety of sources for specific purposes.

Figure 9.13: Regional Financial Mechanism



ADB = Asian Development Bank, AHA Centre = ASEAN Coordinating Centre for Humanitarian Assistance on Disaster Management, AIIB = Asian Infrastructure Investment Bank, ASEAN = Association of Southeast Asian Nations, JICA = Japan International Cooperation Agency, DRM = disaster risk management.

Source: Author.

This facility is expected to serve several functions:

1) Coordination and delivery of disaster finance

The fund for disaster finance in the emergency and recovery stage, unlike general funds (including funds for climate change mitigation actions), does not necessarily need to hold a large amount of cash in normal circumstances. However, a huge amount of finance is needed once an extreme disaster occurs. Thus, the uncertainty of disasters in terms of scale and timing makes the fund inefficient. To overcome such inefficiency, the fund will conclude a contingent line of credit via CAT-DDO agreements with bilateral and multilateral donors such as Japan, the Republic of Korea, China, the World Bank, ADB, the Asian Infrastructure Investment Bank, and ASEAN Member Countries. The fund will receive and coordinate the contributions from these donors, then disburse them to beneficiaries such as governments,

commercial banks, and insurance companies. This fund will be used for emergency liquidity support for governments and as short-term bridge finance for commercial banks for securing liquidity during emergencies.

2) Special purpose vehicle for issuance of CAT bonds

The fund can serve as a special purpose vehicle for the issuance of CAT bonds. According to Artemis (2017), most of the outstanding CAT bonds and ILS are issued by insurance companies and financial institutions in advanced countries. Because of the high-risk nature of the CAT bond and ILS, it may be challenging for insurance companies and financial institutions to issue CAT bonds and ILS with competitive conditions. Therefore, the fund, backed by the donors, should serve as a special purpose vehicle for the issuance of CAT bonds and ILS in favour of local insurance companies and financial institutions to mitigate the risks associated with disasters.

3) Disaster information sharing mechanism

Sharing accurate and timely information amongst stakeholders is indispensable to manage the risks associated with disasters. Even if financial institutions have a function to manage and transfer risk, they are not able to use such a function properly without accurate and timely information. Further, asymmetry of information prevents the ability to take collective actions against disasters. Thus, the fund – in collaboration with the ASEAN Coordinating Centre for Humanitarian Assistance on Disaster Management (AHA Centre) and the Asian Disaster Reduction Center – should serve as an information hub for financial institutions. This would allow governments, donors, and local financial institutions to share information in a timely manner; and permit financial institutions to take appropriate collective actions to cope with disasters.

9.6 Conclusions and Policy Recommendations

9.6.1 Conclusion

In this paper, we discussed the role of financial institutions and their financial instruments in relation to natural disasters. Financial institutions can play a significant role by providing finance, managing risks, and producing information, in theory. Based on those functions, financial institutions develop a variety of financial instruments which is useful in supporting disaster risk management, emergency actions, and the recovery and reconstruction process.

However, each financial instrument has unique characteristics, and the pros and cons of the respective financial instruments were identified. This analysis shows that no single instrument can cover all disaster management and climate change adaptation needs at any stage. This means that knowledge on the appropriate choice and combination of financial instruments and their usage is indispensable for policymakers. In addition, since the scale of disasters and their damages are increasing, some disasters will affect multiple areas and countries without regard for borders. In these cases, single financial institutions or countries will not be able to manage the damage. To cope with this, a funding pool mechanism is proposed. This funding pool mechanism serves three functions in supporting the government and financial institutions to play their expected role.

9.6.2 Policy Recommendations

This study identifies the following policy recommendations based on the above argument. Recommendations 1–3 refer to actions taken by financial institutions, while recommendations 4 and 5 are targeted at the national level, and recommendation 6 applies to regional action.

1. **Financial institutions should improve disaster risk management knowledge and skills as part of credit risk management.**
   In theory, financial institutions can play a significant role in managing risk. However, because of lack of knowledge and skills in managing disaster risks, they may not play a necessary role in disaster risk management. Therefore, it is recommended that financial institutions improve their disaster risk management skills as part of credit risk management by incorporating disaster risk analysis in their appraisal and due diligence process so that disaster risks are taken into consideration in financial decision making.

2. **Financial institutions should act as a 'goodwill' appraisal and monitoring agency to manage disaster-related risks.**
   Financial institutions play a 'goodwill' appraisal and monitoring role in managing credit risks. When they obtain sufficient knowledge and skills to manage disaster risks, they should serve as 'goodwill' appraisal and monitoring agencies, reflecting disaster risks. This may reduce the costs and damages borne by financial institutions as well as their clients.

3. **Financial institutions should develop better financial products to cope with disaster, based on lessons learned and good practice.**
   Financial institutions have developed several financial instruments applicable to precautionary, emergency, and recovery and reconstruction actions. However, some of them may not apply to Asia and the Pacific. Therefore, regional financial institutions should develop or improve financial instruments to cope with disaster in Asia and the Pacific.

4. **Governments should create an enabling environment for financial institutions to play their roles in disaster risk management.**
   One of the key roles of governments is to create an enabling environment for financial institutions to fulfil their role in their respective country and the region. To facilitate this, governments should review their legal and institutional systems, and update them where necessary so that financial institutions may play their roles in disaster risk management efficiently and effectively.

5. **Governments should recognise the role of financial institutions and enhance their knowledge of financial instruments.**
   For better partnering with financial institutions and effective use of financial instruments, the government should recognise the role of financial institutions and enhance their knowledge of financial instruments so that they can provide adequate support for financial institutions and choose appropriate financial instruments at specific stages of disasters.

6. **The proposed funding pool mechanism should be developed to share the risks and information on disasters.**
   Regional collaboration in disaster finance is the key for Asia and the Pacific. As highlighted at the 2nd Meeting of the ASEAN Cross-Sectoral Coordination Committee on DFRI, discussing the next phase of the ASEAN DRFI Roadmap and Programme, the establishment of a regional risk insurance pool in the region is critical to share the risk amongst the countries. The proposed funding pool mechanism will work as leverage for disaster finance as well as a platform to share disaster information to avoid asymmetry of information amongst stakeholders.

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