

## Summary

### [Background to the research]

In recent years, weather-related natural disasters such as typhoons, hurricanes, flood and drought have caused vast amounts of damage all over the world, and these disasters are claimed to be the effects of climate change. According to the “IPCC Fourth Assessment Report : Climate Change 2007”, by the Intergovernmental Panel on Climate Change (IPCC), effects of climate change have appeared in all areas of the world, especially in the form of damage due to the increase in the frequency and intensity of extreme weather phenomena. It is forecast that extreme phenomena will continue to increase in the future. Therefore, in considering the countermeasures to climate change, adaptation measures to lessen the damage caused by the effects of climate change are now in high demand, in addition to alleviation measures aimed at cutting greenhouse gas emissions. Adaptation measures require urgent attention, in particular in developing countries, which are vulnerable to the effects of climate change and are lagging in disaster contingency planning. It requires vast financial resources to employ adaptation measures, which suggests that private funding via market mechanisms could play a role, in addition to each nation's public funding.

### [Purpose of the research]

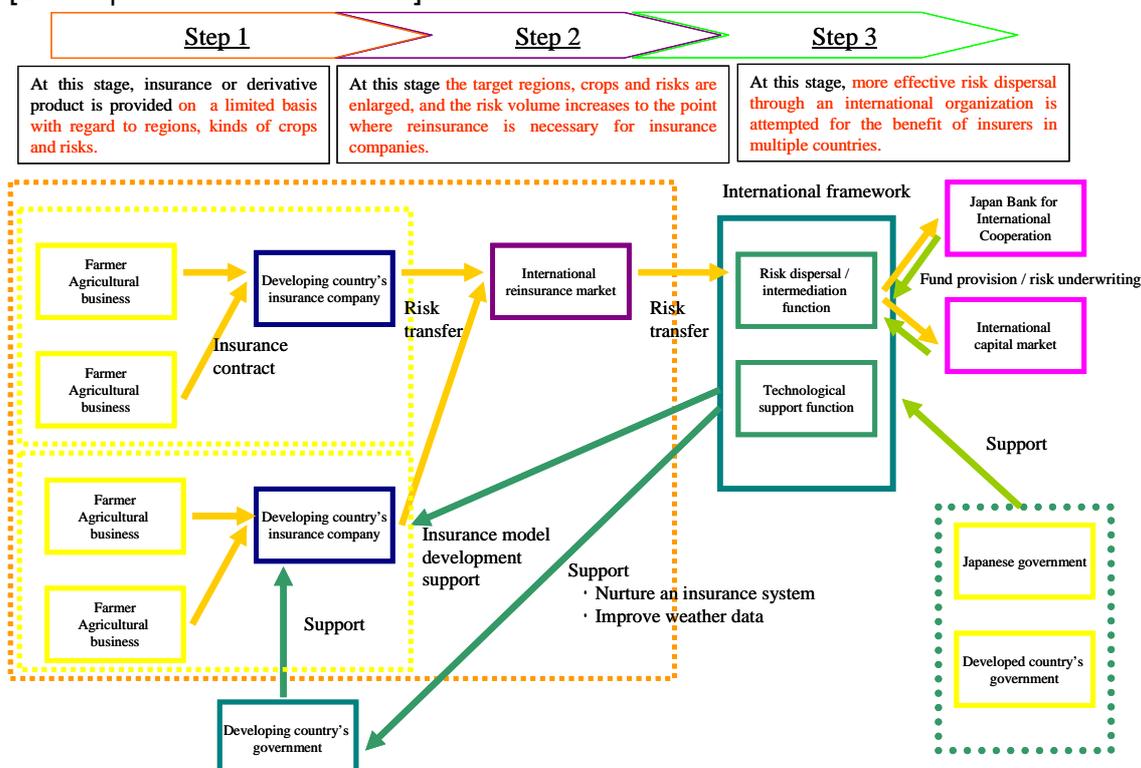
Based on the background described above, this research has as its objective the search for the ideal format of risk financing by utilizing private sector techniques as an adaptation measure against climate change in developing countries. The main target is the agricultural sector in the south-east Asian region, which has strong ties with Japan, and whose weather-related risk is difficult to handle through the private sector alone. The target risk is the weather risk to which agricultural workers are exposed. Utilizing weather index insurance/weather derivatives<sup>1</sup> is considered to be a possible method for helping agricultural workers and/or agricultural businesses to recover quickly from economic damage incurred due to natural disasters such as drought and flood, and to stabilize their livelihood. This research aims to facilitate an understanding of the challenges faced in widening the use of these kinds of private sector risk financing methods in developing countries, and to lead to the formulation

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<sup>1</sup> Weather index insurance/weather derivatives: Financial products enabling the purchaser to receive payment of a previously stipulated sum of money when weather-related indices (such as temperature, wind, rainfall, accumulation of snow, etc.) fulfill certain agreed conditions. By using such financial products it is possible to compensate for reduced profits and increased expenditure incurred due to unforeseen weather conditions.

of plans to meet those challenges.

[Entire picture of the research]



The above graph shows the entire scope of the scheme at which this research is aimed.

- Agricultural workers or agricultural businesses in developing countries take out weather index insurance/weather derivative contracts with local insurance companies, and pay the insurance premiums or option premiums to those companies.
- When a disaster which is designated in the contract occurs, the agricultural workers and agricultural businesses receive compensation from the insurance company, and use it to help them recover from the damage wrought by the disaster. (Step 1 above)
- In the event that the disaster risk exceeds the capability of local insurance companies, the risk is transferred to the international reinsurance market. (Step 2)
- However, insurance systems are not widespread in developing countries, making it difficult for them to pursue this on their own. Therefore, an international framework for the purpose of support is necessary. (Step 3)

[Progress of the research]

Of the countries in the south-east Asian region that are the main targets of the research, north-east Thailand was targeted for a case study because it is thought to be particularly vulnerable to the effects of climate change and have a strong need for weather index insurance/weather derivatives. We have carried out the field study in Bangkok, the capital of Thailand, and in Khon Kaen in the north-east of the country where prominent research organizations are centred. The study themes are broken down into three main areas: (1) "Insurance development" which entails index development and insurance planning; (2) "Spread of insurance" which aims to increase the number of those with insurance; and (3) "Risk transfer" which aims to transfer the risk to international markets for the purpose of more effective risk management. Each item has its own challenges, countermeasures and role for the international framework, and knowledge of this has accumulated in research groups.

[Challenges, countermeasures and the role of the international framework in development of weather index insurance]

Challenges	Details	Countermeasures	What can be expected from the international framework	
Challenges in insurance development	Weather observation system	<ul style="list-style-type: none"> <li>Improvement of weather data</li> <li>Improvement of weather observation system</li> </ul>	<ul style="list-style-type: none"> <li>Development of a joint base for knowledge of data, indices, technology etc., and technique.</li> <li>Necessary financial aid for insurance development</li> </ul> <div style="text-align: center;">↓</div> <div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 0 auto;">(1) Technical support</div>	
	Index development	<ul style="list-style-type: none"> <li>In index development, high-level specialist knowledge is necessary across a variety of fields such as agriculture, meteorology, etc.</li> <li>Customized index development is necessary for each target crop, product, agricultural method and growing pattern in the region.</li> <li>Since a high degree of technology is needed in development, the development expenses are very high</li> </ul>		<ul style="list-style-type: none"> <li>Technical support from, and burden of expenses shouldered by, international framework</li> <li>Sharing of indices</li> </ul>
	Cooperative structure for concerned organizations	<ul style="list-style-type: none"> <li>Coordination of various concerned parties such as research institutions, insurance companies, government offices and so on is important</li> <li>Promotion of the participation of multiple nations</li> </ul>		<ul style="list-style-type: none"> <li>Formation of a cooperative structure for concerned organizations</li> </ul>
Challenges in spread of insurance	Spread of insurance	<ul style="list-style-type: none"> <li>Education activities for agricultural workers</li> <li>Schemes using sales techniques such as package deals of loans and necessary products, and advantageous taxation measures, etc.</li> <li>Shift insurance premium burden to financial institutions and/or agriculture-related merchants</li> </ul>	<ul style="list-style-type: none"> <li>Reduction of cost through sharing of indices, etc.</li> <li>Reduction of cost through dispersal of risk via consolidation of multiple nations risk</li> <li>Provision of insurance premium support to insured individuals or insurance companies</li> </ul> <div style="text-align: center;">↓</div> <div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 0 auto;">(3) Control of insurance premiums</div>	
	of	<ul style="list-style-type: none"> <li>It is necessary to foster better understanding of the benefits of insurance among the agricultural workers, as well as to make incentives to purchase insurance.</li> <li>Setting insurance premium levels which agricultural workers are able to pay is necessary</li> </ul>		<ul style="list-style-type: none"> <li>Control of costs for the purpose of establishing levels of financial burden in insurance premiums that agricultural workers can manage</li> <li>*With weather index insurance, assessment when disaster strikes is unnecessary, which makes it possible to curb administration expenses</li> <li>Insurance premium support to keep premiums at a manageable level for agricultural workers.</li> </ul>
Challenges in transfer of risk	Access to the reinsurance market	<ul style="list-style-type: none"> <li>Risk pooling</li> <li>Intermediation by international framework</li> </ul> <p>(No problem appears to exist, when looking at the current situation of reinsurance transactions in where south-east Asian insurers have little difficulties in reinsurance placement.)</p>	<ul style="list-style-type: none"> <li>Transference of risk to capital markets</li> <li>Risk underwriting by the international framework</li> </ul> <div style="text-align: center;">↓</div> <div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 0 auto;">(4) Securing capacity</div>	
	Capacity of the market	<ul style="list-style-type: none"> <li>It is necessary for insurance companies to make the trading units large enough in order for reinsurance transactions not to be priced below cost, which might be difficult for small insurers in developing countries.</li> </ul>		<ul style="list-style-type: none"> <li>Transference of risk to capital markets</li> <li>Risk underwriting by the international framework</li> </ul>

In order to develop weather index insurance in developing countries, and have it take root as a measure against weather damage to agriculture in multiple regions, there are various challenges at each stage from development to spread and expansion. Many of these challenges can be more effectively met through the establishment of an international framework that will manage the support know-how and funding in a focussed manner. As solutions to these challenges, what we can expect from the international framework can be organized into four functions: (1) technical support; (2) coordination; (3) control of insurance premiums; and (4) securing capacity.

#### (1) Technical support

In developing index insurance products, high-level technique and great expenses are both necessary. Since there is little know-how about weather index insurance development in developing countries, and also since the initial investment is large, it is difficult to bring it to fruition through the private sector alone. Therefore, by providing technical support to developing countries which includes the financial aspect, it is possible to push forward the development of weather index insurance there.

#### (2) Coordination

For the private sector to move toward development and sale of weather index insurance, the first large task they must face is the access to necessary resources and the cost required. Accumulation of data for the purpose of index development, as well as the cooperation of a large number of interested parties is essential in insurance development. Both can be achieved effectively through the international framework encouraging cooperation between interested parties belonging to various fields in multiple countries.

In regard to the spread of insurance, though the education activities for agricultural workers should be carried out directly by local organizations responsible for sales (insurance companies, financial institutions, etc.), the fundamental concept of weather index insurance and its significance are shared by the projects in multiple regions. It is also possible that the international framework will play a part in dissemination activities.

#### (3) Control of insurance premiums

The aforementioned technical support and coordination functions contribute to

controlling the level of insurance premiums, while at the same time curbing the initial investment of insurance companies. Through the international framework shouldering the financial burden of the high cost of development, or through index development being carried out in a shared manner by multiple nations, it is possible to reduce the development costs.

In addition, by bringing about risk consolidation, that gathers the risk of multiple countries into one place in the international framework, insurance premium costs can be reduced by the economy of scale and risk dispersal effects. It is also possible for the international framework to provide cheap reinsurance to the participating insurance companies. Through this measure, the costs for all the participating insurance companies will go down, which is expected to reduce the insurance premiums agricultural workers have to pay.

#### (4) Securing capacity

Regarding the capacity for risk transfer, it should not be a big issue while the market remains small, and the individual insurance companies can retain the risks they underwrite. However, there is room for the problem to arise after the penetration of the product has advanced.

In the event that there is no underwriter in the reinsurance market, the international framework can be the underwriter of “last resort” of the weather risk. In addition, efficient risk transference to the capital market can be realized through the involvement of the international framework, which is difficult to achieve within one company.