【論文】

Implication of the Agricultural Mutual Relief Insurance Scheme in Japan as for the Development of Agricultural Insurance in Monsoon Asian Countries

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Contents

I. Background and Objectives

The World Bank suggests a weather index based insurance scheme is superior. The World Bank's stance on an agricultural insurance scheme is as follows (World Bank, 2008, p.149): "The track record of agricultural insurance directly supplied by governments is not encouraging. In Brazil, costs exceeded premiums by more than 300 percent. …..One innovation that might do so is insurance indexed to an objective indicator of weather, such as rainfall or temperature. …..Because weather is not affected by individual behavior, indexed insurance can address both monitoring costs and moral hazard." World Bank is afraid of the governance failure and tries to widely introduce the agricultural insurance without touching the fundamental and necessary governance improvement. In fact, almost all developing countries confront critical constraints of governance. World Bank seems to promote the agricultural insurance scheme without improving relevant institutions as well as governance in developing countries. What about Japan in monsoon Asia? Japan has had an agricultural insurance scheme since 1947, but a weather index scheme has not been applied.

Many monsoon Asian countries, mainly ASEAN countries, are growing to middle income countries where "middle income trap" becomes serious. In those countries, improving the economic efficiency through institutional and organizational reform and improving governance are urgent and critical issues. In the case of establishing agricultural insurance scheme, there is no reason to avoid institutional and organizational reform and upgrading of governance. As soon, such new scheme or project must be utilized to be a means of improving institutions, organizations and governance. In this sense the experiences of AMR (Agricultural Mutual Relief, known in Japanese as NOSAI) Scheme in Japan is noticeable. The AMR Scheme is architected based on the well-designed institutions and organizations with good governance of farmers' associations and governments although it is supported by large government expenses. As climate is the most influential factor on the risk of agricultural production, in this sense also, the case of Japan included in monsoon Asia should be worthwhile to be reviewed.

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Because of concerns regarding climate change, many arguments on "agricultural insurance" are centered on protecting farmers from natural disasters and food security without increasing government expenses. On the other hand, the World Bank has focused on the issue of bringing agriculture to the market in its World Bank Development Report (WDR) (World Bank, 2008). Chapter 5, titled "Bringing agriculture to the market," pointed out the following roles of insurance (World Bank, 2008, pp.118-137): improving commodity trading and risk management, maintaining international competitiveness, linking producers to modern supply chains, meeting product standards for export, and agribusiness development. In Chapter 6, on insurance to manage risk as an institutional innovation, WDR pointed out that "in addition to enhancing the supply of agricultural credit, insurance can make potential borrowers more willing to bear the risk of conventional collateralized loans. As always, there is a tradeoff. Insurance is costly and leads to higher overall costs when added on to a loan." (World Bank, 2008, p.148). According to the studies of our colleagues in Indonesia, business development has been constrained due to the lack of insurance. In various cases, technical innovation was not sustained due to the lack of agri-business support (see, for example, Indri and Ishii, 2017; Dian, Yonekura, and Takashino, 2013).

Recently, in Japan, the insurance is being reformed to income insurance as part of the progress of commercialization and globalization. In the era of commercialization and globalization of agriculture, although food security is essential, so is sustainable agribusiness development.

This study's goal is to cast a spotlight on the institutional and organizational architecture and governance not only for continuously ensuring food security but also for facilitating access for farmers to the developing urban and overseas markets. Established in 1947, the agricultural insurance scheme in Japan has a relatively long history. As it is backed up by the government, the budget burden is large and it does not have a good reputation from the World Bank's point of view. As a persistent mechanism for reducing moral hazard and adverse selection, however, the insurance scheme of Japan deserves to be recognized from the view point of business continuity as well as food security.

The objective of this study is to investigate how the AMR Scheme in Japan maintains the insurance business, and encourages farmers move toward the scheme. In this study, farmers/villagers are regarded as critical human resources, and they need to be developed, not as insurance clients, but as leading players/stakeholders for implementing the insurance scheme. This study reviews the NOSAI scheme's principle, its organization and governance, the way it assesses disaster damages, various options of insurance policies, and incentive design.

II. Architecture of the Agricultural Insurance Scheme in Japan (NOSAI)

It is certain that Japan's agricultural insurance is not necessarily unusual (Table 1). Many countries, mainly high-income countries, have subsidized insurance schemes for the agricultural sector. However, even relatively low-income countries like the Philippines also subsidize an agricultural insurance scheme. World Bank and FAO studied about the points of concern for the government support agricultural insurance in developing countries

Table 1. Availability of Crop and Livestock Insurance in Selected Economies

Country Subsidized	Crops (peril)	MPCI	Revenue	Live stock	Index-based
Austria	x	x		Mortality	
Canada	x	x	X	All risk	Crops
Cyprus	x				
Czech Republic	x			Mortality	
France	x	x		Mortality	
Israel	x			Mortality	
Italy	x	x		Mortality	
Japan	x	x		All risk	
Portugal	x	x			
Slovenia	x			All risk	
South Korea	x	x		Mortality	
Spain	x	x		Mortality	Crops
Switzerland	x	x		Mortality	
United States	x	x	X	Price/Margin	Crops, rangeland
Philippines	x	x		Mortality	Crops

Source: Celia M. Reyes et al., 2017.
Note: x means in point. MPCI: multi-peril crop insurance.

(World Bank 2010, FAO 2011). The basic feature of the agricultural insurance scheme of Japan is evaluated as follows: “Based on a spirit of mutual aid among farmers rooted in farming community, the government supports AMRAs (AMR Associations) and farmers as well as establishes the system or scheme based on partnership. This unique system of farmers’ participating in insurance successfully reduces transaction cost. Insurance and loss control are like the two wheels of a cart, being twin-engine for sustainable growth in the disaster crop insurance market. Additionally, loss control is not only a tool for saving insurance cost, but also for enforcing a cooperative relationship among famers in some cases.” (Okada, 2016).

The Agricultural Mutual Relief (AMR) Insurance Scheme lays the foundation for local farmers' cooperative actions to establish a joint reserve fund by accumulating contributions as premiums to make up farmers’ losses caused by natural disasters[1]. This is insurance operated by associations or municipal governments. Because agriculture is vulnerable by nature, the risk cannot be adequately dispersed within the limit of local communities or even prefectures. Therefore, this insurance program is operated as a device for dispersing risk, in which liabilities of the AMR Associations and the municipal governments are reinsured by their prefectural federation, and further, the federations' liabilities are re-reinsured by the central government.

Since a legal body between the farmers and the central government is allowed to commit to the insurance scheme, any group of farmers without legal status cannot be insured. The intermediary business of (insurance) brokers is impossible. This eventually helps to avoid moral hazard and adverse selection. For rice, wheat and barley insurance, and livestock insurance, implementation of the scheme is compulsory for associations. Participation is compulsory for farmers who cultivate rice, wheat or barley over the

Table 2. Criteria of Compulsory Participation of the Scheme

Territory (by Prefecture)	Item of AMR	Minimum area (ha)
Prefecture	Paddy rice	0.2 ～ 0.4
	Upland rice, Wheat, Barley	0.1 ～ 0.3
Hokkaido	Paddy rice, Upland rice	0.3 ～ 1.0
	Wheat, Barley	0.4 ～ 1.0

Source: MAFF (Ministry of Agriculture, Forestry and Fisheries) 2017.
Note: Farmers who cultivate more than the minimum area are obligated to join the AMR Scheme. The minimum area is fixed by the governor of each prefecture.

specified area (Table 2). Half of the premium (in seasonal or annual payments) is subsidized by the government. The government also bears a part of the operational expenses of the organizations. The government (re-)reinsures for the indemnity payment of the scheme, excluding the farmer's house insurance.

The predominant features of the NOSAI Scheme of Japan are summarized as follows:

(1) Mutual relief system: committed by farmers themselves,
(2) Voluntary and compulsory participation: rice, wheat and barley insurance is compulsory for individual farmers and for AMR Associations for food security,
(3) Coverage: limited to production risk only, marketing and management risk are not insured,
(4) Coverage under the contract of agricultural insurance: about 60 % of agricultural outputs,
(5) Financial Performance: Sustainable base is maintained through subsidies by three areas of government,
    (i) Subsidy of farmers' premiums: 50% of the premium is subsidized;
    (ii) Operational subsidies to insurers of AMR to cover the administrative costs associated with operation of the scheme; and
    (iii) Reinsurance: 100% insurance liability is guaranteed through (re-)reinsurance and AMRAs' insurance.

This well-designed architecture, backed up by the reinsurance system, multi-stage assessment of claims, and a peer monitoring system among farmers, has encouraged farmers' participation and reduced moral hazard, adverse selection, and system loss.

An insurance policy is designed by considering the characteristics of risk of agricultural products, claim settlements, the intensity of clients' commitment, and so on. Damages in Japan are generally assessed in a manner of "insured perils." Insured perils are wind hazard, flood, drought, cool summer damage, snow disaster, other meteorological disasters (including earthquake, eruption, tsunami), fire, disease and insect damage, and damages by wild life (beasts and birds).

Insured perils are applied for paddy and upland rice, wheat, barley, upland crops[2], livestock[3], and fruits[4]. Insured perils for fruit trees are comprised of rampike, washout, loss, laid and buried, depredation, and other damages caused by meteorological disasters.

Greenhouses include glass greenhouses, PVC greenhouses, and weather sheds (rain cover). Insured perils are wind hazard, flood, drought, cool summer damage, snow disaster, other meteorological disasters (including earthquake, eruption, tsunami), fire, burst/explosion, crash or minor collision of aircraft, fallen matters from aircraft, clash or minor collision of automobile/its loaded matter, pest and disease, and damages by beasts and birds.

Characteristics of risks critically affect the architecture of the insurance scheme. In general, risks attack agricultural sectors in diversified ways, and cause different degrees of damages, and reduced yields. Risks are diversified per: (1) crop, (2) farm unit, block or limited territory, local area, nationwide etc., and (3) time/days, season, year, several years, etc. Claim settlements for crop insurance are, in general, comprised of Insured Perils, MPCI (multi-peril crop insurance: yield based), Crop Revenue, and Index based. Livestock insurance is comprised of various risks of accident and mortality, index based, and epidemic disease. Claim settlements of damages and resolving indemnity are the key components of insurance policies.

Delivery channels or, in other words, stakeholders, include, for example, (insurance) brokers, stock agents and banks, cooperatives, and farmer's associations. Cooperatives tend not to be necessarily elaborate but can be considered important delivery channels or "insurance agents." The channels are unified through the AMR Associations/ Federations in Japan.

Table 3. Agricultural Mutual Relief (AMR or NOSAI) Scheme in Japan

	農業共済 Insurance of Agricultural Mutual Relief (AMR) Associations	農協の共済 Insurance of Agricultural Cooperative
Law	農業災害補償法 the Agricultural Disaster Compensation Law (Law No.185 of 1947)	農業協同組合法 the Agricultural Co-operative Law
Program	Rice, wheat and barley Livestock Fruits and their trees Upland crops, Sericulture Greenhouses Houses (short-term: non-refundable), Equipment /Machines (short-term non-refundable or savings-type insurance)	Human life, Mobiles, Houses (long-term)
Participation	Rice and other grains: compulsory Others: compulsory or voluntary	Voluntary
Government support for premium	40～55%	None
Implementing Institution	NOSAI (AMR Association)	JA (Japan Agri. Cooperative)

Source: NOSAI home page, http://www.nosai-ngs.or.jp/kyosai/.

Box: Japan Agricultural Cooperatives (JA) in brief
- JA Kyosai and NOSAI are different institutions.
- "JA group" includes administrative bodies that supervise regional co-ops across several prefectures, run wholesale businesses in food products and production inputs across municipal and prefectural borders (Zen-Noh), manage credit unions (Norinchukin Bank), offer insurance (JA Kyosai), and a national headquarters that controls the entire group and manages government relations (JA Zenchu).

The overall architecture of the AMR (NOSAI) Scheme is shown in Table 3. For reference, NOSAI is compared with JA Kyosai (Insurance of Agricultural Cooperative Japan, see Box too).

III. Organization and Performance

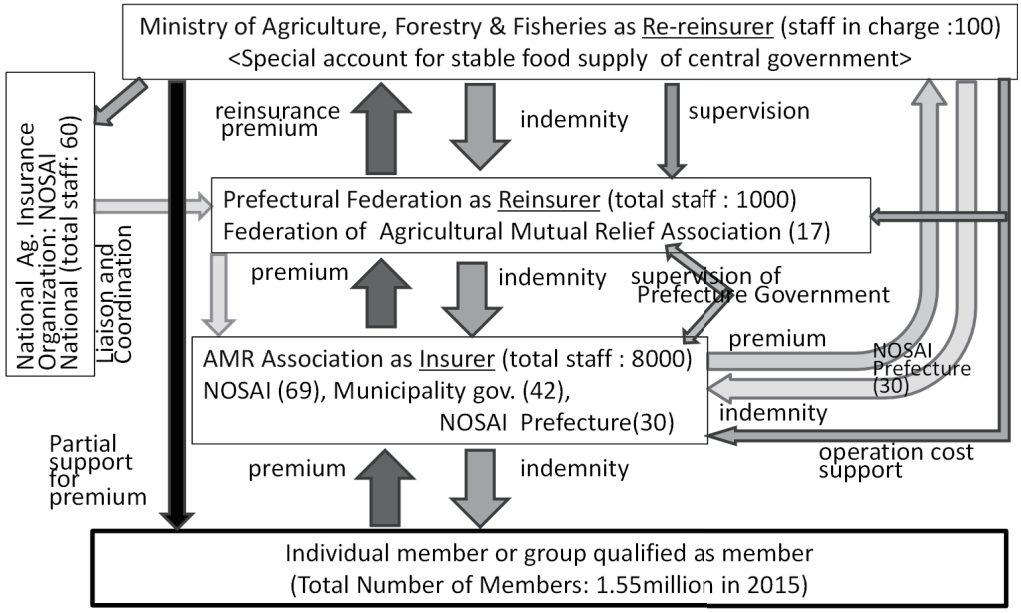
An "agricultural insurance pool" could act as a risk aggregator, providing farmers and herders with affordable and effective agricultural insurance that is financially sustainable in the long term, without heavy public subsidies (Mahul and Stutley, 2010, p.163). The extent of the government burden mainly depends on the necessity of food security. In populous countries like many Asian countries including Japan, the extent could be inevitably greater than in less populous or food grain export countries. Nevertheless, it is essential to pay meticulous attention to reducing the heavy public subsidies. The AMR Scheme in Japan mobilizes individual farmers and their associations and even local governments as players. These players can manage their insurance from an ownership perspective. Through their daily activities, they can mutually acquire insurance operation know-how and skills and, at the same time, they can deepen their understanding of the risks attached to their farm plots, farm units, and the entire territory of the association. The players are mutually linked by the relief system. In this sense, the AMR Scheme seems to work as an "agricultural insurance pool," which was pointed out by Mahul and Stutley (2010)[5].

Figure 1 shows the organization of the AMR Scheme (Agricultural Mutual Relief: NOSAI). The AMR Scheme is basically comprised of four levels, namely, (1) individual farmers (including groups qualified as members) or policy holders, (2) AMR Associations (AMRA) at the municipality level, (3) AMR Federations at the prefecture level, and (4) MAFF (Ministry of Agriculture, Forestry and Fisheries).

The total number of individual members of the AMRs was approximately 1.55 million in 2015 and there were 69 AMRAs. In addition to AMRAs, 42 municipality governments (where no insurer AMRA is organized) joined the scheme. There are another 30 AMRAs (NOSAI Prefecture) at the prefecture level where one AMRA covers the entire territory of a prefecture, and directly works with the central government.

An AMR Federation is usually organized in each prefecture by the AMRAs and municipality governments. The 17 AMR Federations operate as reinsurers and work with the central government. NOSAI National works as the liaison and coordinator for the AMR Federations and AMRAs.

As of 2007, in terms of staff members, manpower for operating this scheme was: AMRAs, about 8 thousand; AMR Federations, about 1 thousand; and NOSAI National, 60



Source: NOSAI homepage and MAFF processed by author.
Note: Number of staffs as of 2007. Number of associations/ federation as of 2017.

Figure 1. Organization of AMR (NOSAI: Agricultural Mutual Relief) Association Scheme

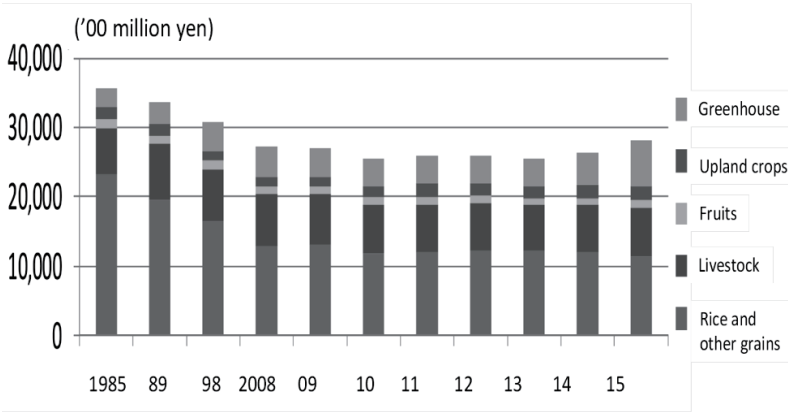


Figure 2. Amount of Insurance Covered by the AMR Scheme
Source: MAFF 2017.

staff members. Approximately 100 staff members oversee this scheme at the national level of the MAFF.

Recently, the size of this scheme in terms of insurance amount is approximately ¥2.8

Table 4. Coverage by Object in 2015
(April-March)

Target Object	Rate of insuring (%)
Paddy rice	92
Wheat and barley	98
Dairy cattle	93
Beef cattle	67
Fruits (harvesting)	24
Upland crops	70
Green house	47

Source: MAFF 2017.

trillion (Figure 2, ¥110÷$1). This amount has tended to decrease due to the gradual diminution of the agricultural sector in the national economy of Japan. The largest share is rice, wheat, and barley (40 percent), followed by livestock (30 percent). This covers approximately 60 percent of the total value of agricultural products. The proportion of area under the insurance is more than 90 percent of farmers in the program for paddy rice, wheat, and barley (Table 4). The share of dairy cattle is also more than 90 percent in terms of head-count[6].

Figure 3 shows the actual disbursement of indemnities during the quarter century since 1990. In ordinary years, the amount of indemnities is less than 100 billion yen. The share of livestock is the highest among the five programs of insurance. In years of serious disasters, like strong typhoons or cool weather, particularly during the summer season, damages have been extensive and intensive. Japan experienced three severe years during the last quarter century. In 1991, Japan was hit by a typhoon, and in 1993 and 2003, Japan experienced cool summers that caused large scale crop failures. The scheme seems to work effectively

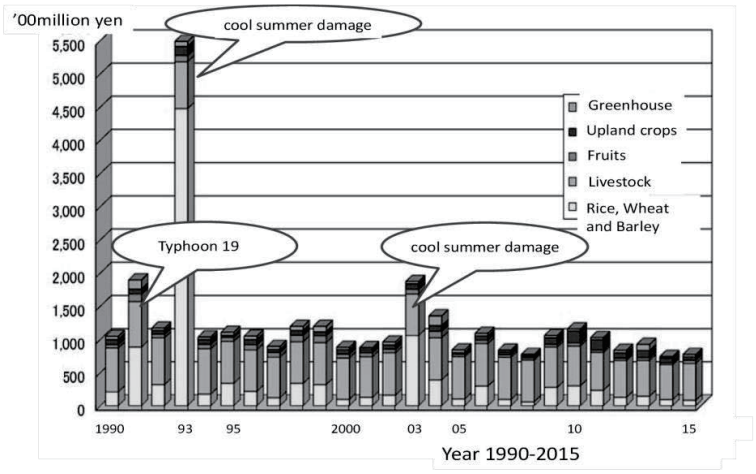


Figure 3. Disbursement of Indemnities
Source: MAFF 2017.

both in ordinary years and severe years.

In 1993, rice production decreased to approximately 70 percent of an ordinary year, and suddenly about 2 million tons of rice were imported, an amount so large that it caused a disturbance in the world rice market. Payment of the indemnities to rice, wheat, and barley, mostly rice, amounted to more than 400 billion yen. The severe disasters seem to happen at longer intervals. In 1994, just after the severe damage of 1993, the scheme members quickly recovered from the systemic shock. The scheme itself was maintained and quickly got back to its usual operations. Japan maintained the government supported insurance system for the agricultural sector to ensure sufficient measures for such heavy, large, and systemic risk.

IV. Insuring Method of Insurance Policies

The AMR Scheme has given as much thought to the content of insurance policies as to the architecture and organization of the scheme. As disasters attack in various ways by plot, unit of farming, territory, season, or years, there are various options for insurance policies through the Scheme. Farmers themselves consider their farming conditions, and select their insurance policy from various options. It is very helpful for farmers who seriously try to mitigate the negative impact of disasters with cheaper premiums. In these days, income compensation to reduce the negative impact of globalization is being introduced, along with the development of bookkeeping and a tax collection system.

For rice, wheat and barley, there are four different insuring methods as shown by Table 5 and Figure 4. Guaranteed yield level for paddy rice, for example, is varied from 50 percent to 90 percent. Premium value is also different, in accordance with the guaranteed level. Farmers can select the best option considering their farming conditions and their own farm skill, etc. The premium is fixed by the association and authorized by the central government. Table 6 shows the farmers' selections of insuring methods. In the case of rice, approximately 80 percent of farmers select the guarantee of yield by plot. *"Unsyu* orange"

Table 5. Menu of Insuring Policy by Program

Program / Insuring Method	Rice, wheat and barley	Fruits	Upland Crops (option by each crop)	
			e.g. Soybean	e.g. Sugar beet
Yield by Plot	○	○	○	
Yield by Damaged Plots	○	○	○	
Yield by All Plots of a Farm	○	○	○	○
Decreased Farm Income	○	○		

Source: MAFF 2017.
Note: ○ means coverage.

(the most popular orange in Japan) farmers select the guarantee of income by farm unit. However, apple farmers prefer the guarantee of yield by damaged plots. Upland crop farmers prefer the yield by all plots of a farm. Table 6 implies that farmers and AMRs consider various conditions and select the proper policies from the menu.

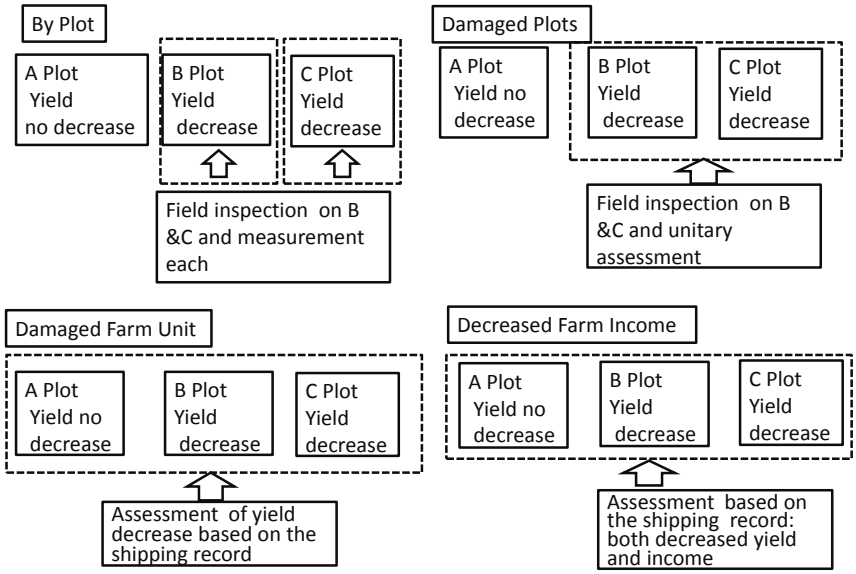


Figure 4. Assessment of Damage by Insuring Method: Example of A Farm with Three Plots
Source: MAFF 2017.

Table 6. Preference of Insuring Method by Members

(% : in 2015)

Insuring Method	Rice and other grains			Fruits			Upland Crops	
	Paddy rice	Wheat, barley	Total	"*Unshyu* orange"	Apple	Total	e.g. Soybean	Total
Yield by Plot	79	7	68	-	11	10	15	6
Yield by Damaged Plots	9	0	8	34	89	62	3	10
Yield by All Plots of a Farm	9	10	9	0	-	2	83	84
Income by Farm Unit	3	84	15	65	-	26	-	0
Total	100	100	100	100	100	100	100	100

Source: MAFF 2017.
Note: Figures of % in this table are calculated on the basis of contract area.

In the AMR Scheme, just 50 percent up to 90 percent is insured, instead of the standard yield level. This is to give farmers the incentive for self-reliant effort and work, as a means of reducing moral hazard and adverse selection. Because of peer monitoring in the process of the assessment of damage, farmers can know each other's standard level of yield rate. Farmers can understand each other's farming skill level and diligence. Because of this, the decrease in yield and other impacts of disasters can be evaluated in detail and fairly.

The method of fixing indemnity is as follows. Let the indemnity by plot of paddy rice be as follows (see Figure 5):

Guaranteed level of crop failure: 70% of standard yield (other options: 60%, 50%),
Unit price of insurance ¥300/kg (fixed by insurance policy),
Standard-yield 500kg/10 are, and
Actual yield 300 kg.

Insured amount per 10 are is

¥300*500kg*0.7=¥105,000

and, as displayed in Figure 5, the farmer can receive indemnity

¥300*50kg=¥15,000 per 10 are.

The premium is calculated using the formula of a unit value of insurance multiplied by the rate of premium. The rate of premium is updated every three years based on the damage rate during the last 20 years. The actual premium payment made by farmers is 50 percent of the premium. The other 50 percent is subsidized by the government. If the rate of premium is 0.5 percent, the farmer pays

50% * 350kg*(¥300*0.5%)= ¥262.5/ 10 are.

The premium rate is fixed by each product item and by the unit of insuring based on the frequency and degree of damages so that the insurance balance can be maintained in the

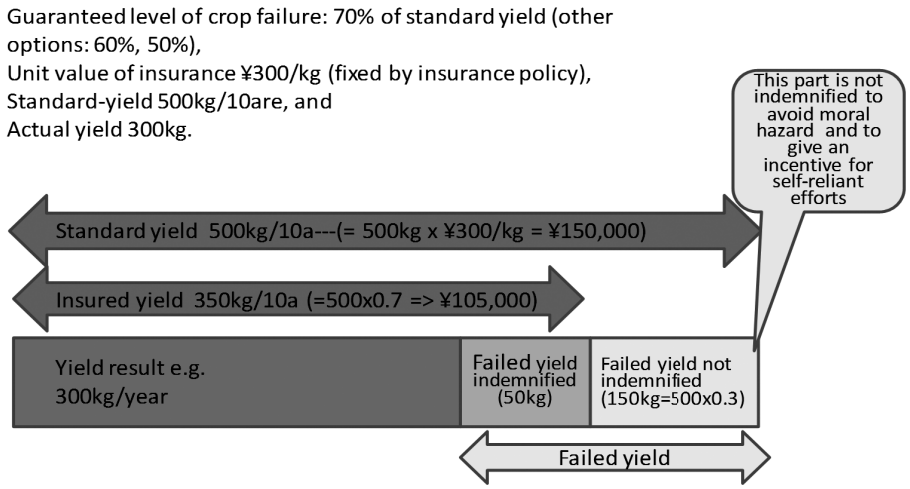


Figure 5. Calculation of Indemnity: Paddy Rice by Plot
Source: MAFF 2017 and author's processing.

long run. The central government decides the base rate of premium by each AMRA (including municipalities). Each AMRA applies the premium rate to its members at not less than the base rate fixed by the central government. The premium rate applied to each member must in general be the same within an AMRA, but an AMRA is partially allowed to differentiate the rate by member considering damages. If a member's total amount of paid premium is less than that of indemnity received for the last number of years, the AMRA can refund a certain portion of paid premium to the member based on the AMRA's independent judgement (called "*Bujimodoshi*").

The average premium payment placed burden on farmers can be estimated by the Loss Ratio (Indemnity/ Premium) and Damage Rate (Indemnity/ Insurance) in Appendix 2. The Damage Rate over the Loss Ratio which means the raito of premium payment over insured value was 3.5% (= 0.027/0.761=0.035) in 2015. As this year 2015 can be count as a regular year in terms of production risks of agriculture (see Figure 3), the premium/ insurance 1.7%, namely actual premium payment rate taken over by farmers (50% of the premium is subsidized by the government) could be regarded as the affordable and willingness level of premium payment and as the sustainable level for maintaining the AMR. Considering the long and sustainable experience of the AMR Scheme in Japan, this average premium payment rate (or insurance rate) can be understood as the incentive level to make farmers continuously join the scheme and a useful reference value for designing insurance scheme and policy[7].

V. Mechanism for Reducing Moral Hazard and Adverse Selection and Its Government Cost

The multilayered configuration comprised of the member farmers, local association/ municipality, federal association, and the central government allows repeated crosschecking of yield losses (Figure 6). The scheme covers the various product items but is limited to certain items that are measurable. Therefore, leaf vegetables, such as cabbages, spinaches etc., are not covered by the AMR Scheme. The coverage the AMR Scheme envisions is not that ambitious, but it covers approximately 60 percent of all agricultural products in Japan. Through the re-insurance system, the indemnity is shared by the AMRAs, the AMR Federations, and the central government.

The central government expense for this scheme was about ¥88 billion in 2015. This was comprised of ¥50 billion for the governmental burden of premiums and ¥38 billion for subsidizing the operational cost of the AMRAs and Federations. The loss ratio on average was just under 1.0 (0.761 in 2015) and the damage rate was 2.7 percent in 2015 without any heavy disasters (Appendices 1 and 2). Indemnity is financed by the premiums from members and the government. The residual (1-0.761=0.239) is mainly allocated to the account for the re-reinsurance fund of the central government and AMR Federations.

The AMR Scheme uses a practical method to ensure yield levels rather than yield loss. Damage assessments and claim settlements are done at all three phases: the association, the federation, and the central government. In the case of insuring by plot, an initial assessment of damaged plots is done by a group of three association members, and then the association staff carries out a random sampling survey to clarify the report. The double assessment is done within an AMRA, as displayed in Figure 6. Without such voluntary peer monitoring,

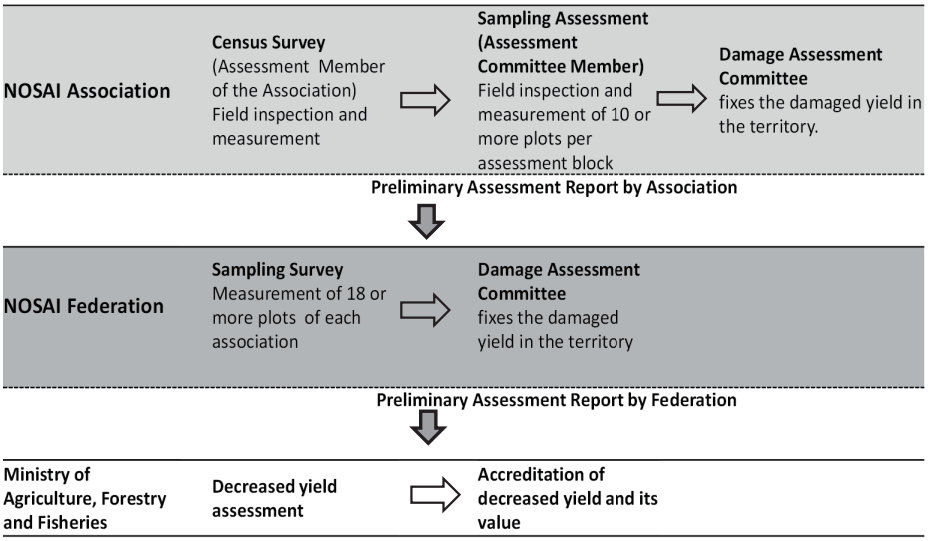


Figure 6. Settlement of Claim System
Source: NOSAI home page.

the scheme would not be different from the regular insurance business. This is a very essential element of mutual relief.

The result authorized by the damage assessment committee of the association is reported to the federation level. The federation carries out a sampling survey again, based on the report from the individual association. After being authorized by the damage assessment committee of the federation, the result is reported to the central government. Based on the federation report, the central government reviews the damages and accredits the decreased yield. Mutual relief insurance, reinsurance, and re-reinsurance are implemented based on this accreditation.

Monitoring, assessment, and claim procedures are executed on a routine basis, and this includes the frequent practices of the association staff, as well as member farmers. The standard yield, for example, can be correctly estimated and set using the multilayered system that begins with peer monitoring within the association. Various critical criteria and indicators, for example, the premium rate, are authorized by the Minister of the AFF, but many options and allowances are provided to AMR member farmers, associations, and federations to keep the scheme flexible.

This operation, however, has become difficult due to the depopulation and aging of farmers. Japan is already in the era of a population onus. The economically active population has decreased, and the agriculture sector's share of employment has shrunk. The population of rural societies has also rapidly gotten smaller, and many rural communities are in the process of extinction.

The total number of AMRAs has declined. In 1947, the year the AMR Scheme was

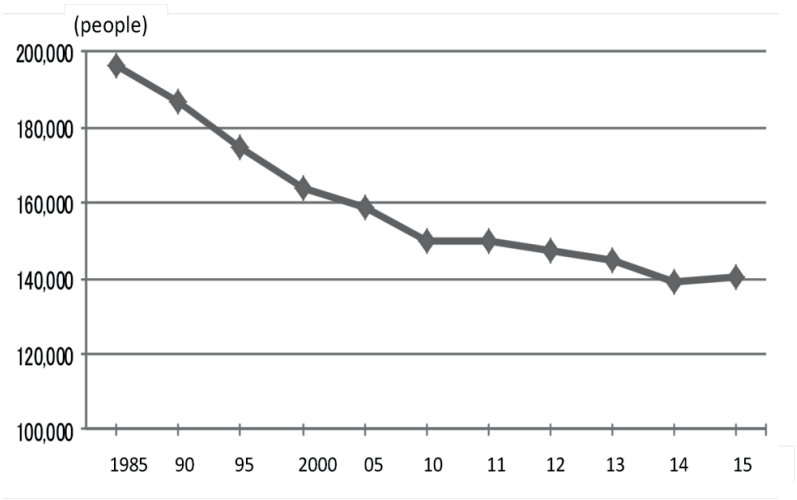


Figure 7. Depopulation of Members for Damage Assessment
Source: MAFF 2017.

established, there were 10,541 AMRAs and 46 AMR Federations. In 1965, 872 municipalities were involved in the scheme. In 2016, there were only 69 AMRAs and 42 municipalities. Recently, 30 AMR Prefectures were established to unify entire prefectures. An AMR Prefecture can be operated like a Federation. Due to the depopulation of the rural society, merging AMRAs was inevitable for maintaining operations and improving efficiency. More recently, the depopulation of members makes it hard to maintain voluntary damage assessments. Figure 7 shows the decreasing trend of the numbers of AMR members who undertake voluntary assessments. The available manpower for mutual assessment of damages is approximately 140 thousand members, which has gradually decreased over the last 30 years. This could cause vulnerability of the foundation of mutual relief and peer monitoring that has helped minimize moral hazard and adverse selection.

In principle, the AMR Scheme member must be an individual farmer. AMRAs and AMR Federations/National must be legal bodies registered by the Legal Affairs Bureau. In addition to individual farmers, legal bodies of farmers' groups are allowed to join the AMR Scheme. A non-legal body can also join the scheme but it must be qualified. The essential conditions as a member of the AMRA are as follows: (1) The group has a mandate and regulates the rules of premium payment and distribution of received indemnities; (2) All members of the group must live within the territory of the AMR association. (3) The program is open only to farmers of rice, wheat and barley, upland crops, and fruits. These conditions are very crucial to make clear the locus of responsibility and to avoid the diffusion of responsibility, particularly at times of damage and failure of the farm economy. The total number of such qualified groups lately is approximately 5,500.

Table7. Budget for the AMR Scheme Implementation

(million yen)

	2011	2012	2013	2014	2015	2016	2017	2017(%)
AMR Budget Total	91,103	89,345	89,199	89,136	89,023	88,589	88,235	(100%)
Government share of Premium (/ indemnity)	50,110	50,110	50,110	50,110	50,110	50,110	50,110	(56.8%)
Operational cost of AMR	40,285	38,685	38,585	38,525	38,425	38,025	37,689	(42.7%)

Source: MAFF 2017

Note: Budget expense based on the Agricultural Disaster Compensation Law (Law No.185 of 1947). The government share of premium is, in principle, 50% of total premium.

A written code enables members and associations to reconcile disputes at the time of default. A simple voluntary farmers group without such a code cannot be involved in the scheme; this would make the enforcement of a debtor's responsibility impossible. This rule is critical to keep the scheme's accountability and responsibility, and to implement proper management with mutual reliance. This legally enhanced system has enabled the AMR Scheme in Japan to maintain sustainable operations for 70 years.

To access developing agricultural markets, for example, livestock or vegetable markets, farmers usually need credit supplied by banking institutions. A loan contract usually requires collateral. In this case, insurance can play the role of a credit guarantee. The insurance scheme is helpful for small and vulnerable farmers, not only to compensate for yield failures, but also for access to the banking system. The credibility of the insurance scheme certainly facilitates farmers' access to prosperous markets.

The central government budget for the AMR Scheme was approximately ¥ 88 billion in 2017 (Table 7). About 56 percent is allocated to premium subsidies in recent years, and the rest goes to operational costs of the scheme. The government's share of premium is, in principle, 50 percent of the total premium. The budget of AMRAs and federations was ¥99.4 billion in 2015, and 38.6 percent was subsidized by the government. The manpower cost of AMRA staff was 58.6 percent of the AMRAs' budgets. The cost of damage assessment was only ¥2.1 billion (2.1 percent).

Through the annual activities of the scheme, the central government can reserve the residual of the scheme (Table 8). The residual is earmarked as the reinsurance special account. The special account cannot be expanded, but is spent the next year as part of source for the re-reinsurance fund.

The central government is now reforming the Scheme toward income insurance instead of yield insurance. This may mitigate the impact of price changes on members under free trade and globalization. The reform can be expected to extend the insurance items covered, and to reduce the cost of various transactions, as well as the manpower required for the AMRAs. The Scheme plans to utilize declared income, recorded on the blue form for income tax (*Aoiro Shinkoku*) to assess the damages resulting from an income decrease. Farmers are obligated to become "blue return taxpayers." In Japan, there has been

Table 8. Revenue and Expenditure of the Central Government: Reinsurance Special Account
(Unit: million yen)

Program Account	2001	2002	2003	2004	2005	2006	2007	Cumulative total for fiscal 1947 to 2007
Agriculture: Rice and the other grain	32,368	27,622	-58,277	-2,709	22,870	10,596	19,993	62,339
Livestock	1,353	331	257	512	2,280	-129	1,995	34,740
Fruits and Fruit-trees	1,844	2,483	1,263	-3,503	2,580	1,057	1,528	-31,741
Green house	1,193	714	874	-3,182	649	808	1,174	15,661
Total	36,758	31,150	-55,883	-8,883	28,379	12,331	24,690	80,999

Source: NOSAI Japan
http://www.nosai.or.jp/nosai_kasou/nosai_eng_07.html

a "*Kuroyon Problem*" (9-6-4: Ku-ro-yon) problem. It has been said that the tax office can capture about 90 percent of office workers' income and 60 percent of self-employed businesses, but only 40 percent of farmers' income. Linking with the blue declaration form for income tax, the AMR Scheme is expected to secure a more precise damage assessment with less manpower and management cost. Changing the mode of operation from yield based to income based is achievable along with improvement of the tax collection system.

VI. Summary and Implication of the AMR Scheme

Various features of the AMR (NOSAI) Scheme of Japan could be worthy of consideration for further development of an agricultural insurance scheme in developing countries of Asia. Japan's experience is summarized in the following five points.

First, the architecture of the Scheme is basically as follows: it is operated based on the self-reliance of the association members, and is financially guaranteed by a multilayered risk dispersion mechanism; the premium payment for the Scheme is shared by member farmers and the central government subsidy; this enables the Scheme to compel AMR members to participate in the insurance program for rice, wheat, and barley to ensure food security.

Second, the organization that operates the AMR Scheme is composed of municipality level associations, municipalities, prefectural level federations, and the national level association. This makes frequent and close contact with each level of government and sustains the reinsurance mechanism. The central government can precisely monitor operations at each level and collect reliable information.

Third, there are many options for insurance methods, insured levels, and program items. The AMR member farmers have some room to select the options themselves, although it is partially compulsory. Peer monitoring and the self-reliance principle is strengthened by the close collaboration between the association and the government.

Fourth, these features mentioned above enable farmer members and their association to retain ownership of the scheme. Farmers are not just like clients of the insurance business, and an insurance association does not operate just as an administrative instrument

to disburse government subsidies. Various players of the Scheme at each level, including governments and the mutual relationship among them, have promoted the formation of an "agricultural insurance pool." This has contributed to the operation of the AMR Scheme for 70 years.

Fifth, a mechanism for reducing moral hazard and adverse selection needs to be built into its architecture, organization, and various policy options. Measuring reduction of moral hazard and adverse selection is hard, but it can be expected that the mechanism ultimately enables reduction of the cost of operating the insurance scheme, and helps realize sustainable operations. Special attention must be paid to the accountability and responsibility of the members and associations. A group of farmers is allowed to join as a member of the insurance association, but the group must be a legal body or at least qualified by its written mandate in the AMR Scheme. The insurance scheme is not a sort of project with a limited period. It must be operated not by voluntary groups, but by going concerns which are legally mandated.

As for implications for developing countries in monsoon Asia[8], the following points extracted from the experience of Japan are worthwhile.

Forming an insurance association could be an effective institutional reform to facilitate farmers' participation in an insurance scheme and to create a substantive food security system. The insurance association as a substance of mutual relief under the AMR Scheme in Japan has realized the farmers' participation and established the ownership of the scheme. This can contribute to reduce the cost of monitoring various risks and damage assessment by mobilizing sufficient manpower of association members. The AMR Scheme is not just a disbursement mechanism of the central government subsidy for agricultural insurance. Agricultural insurance in monsoon Asia can be effectively operated not by farmers as clients of insurance program but by farmers' participation with their ownership through mutual relief. Mutual relief can be expected to solve the problem of low participation of farmers to agricultural insurance scheme in monsoon Asia.

Various resources such as extension workers, facilitators for rural development, various governmental services through village administration and rural financial institutions have been injected into rural communities, for example, in Indonesia. If these resources or institutions are well organized and linked, they can be mobilized toward creating and operating an "agricultural insurance pool" as a risk aggregator and sustainable reinsurance mechanism. A mutual relief association could be the core of this pool. This pool is expected to reduce the redundant efforts of development and realize an effective and resilient insurance scheme. This can be a development effort along with solving "the middle income trap."

The commitment of local (village or municipality) governments is necessary to establish and support the mutual relief association. A grass roots "agricultural insurance pool" involving local governments can operate effectively and be resilient. The commitment of local governments may by itself contribute to their capacity building and improving governance in a practical manner.

During the last quarter century, Japan has experienced large and severe disasters which could be regarded as systemic turmoil. The AMR Scheme is often criticized because of its large annual budget expense; however, the Scheme endured and responsibly afforded the

disbursement of insurance and reinsurance even in a severe disaster year. The Scheme shows the resilience backed by the determined and foursquare policy for food security. Severe disasters will be repeated in the future in monsoon Asia countries. As typhoons, cyclones, El Nino, and other broad scale severe disasters can hit people in the region, agricultural insurance needs to be ensured by the determined and foursquare policy for food security like Japan. Without such ultimately secured system, agricultural insurance cannot realize the wider participation of farmers as well as their ownership about the scheme.

This study pays special attention on a role of insurance that links farmers to modern supply chains, for example, higher-value urban markets and overseas markets, in the commercialization of agriculture and globalization, such the establishment of economic partnership frameworks as the AEC in Southeast Asia. Given the rapid commercialization of agriculture, the subsectors of vegetables and livestock tend to seek out new urban city markets or overseas markets where business risks are high. If farmers cannot make the shipping weight and quality of crops set by the contract, they could be charged penalties. An agricultural insurance scheme can mitigate such risks and avoid the collapse of the relationship of mutual trust, particularly when farmers or small rural traders encounter defaults caused by severe disasters. In this sense, an agricultural insurance scheme needs to be designed to facilitate activities in progressive markets by linking them with the financial system. Agricultural insurance assured by farmers' participation and ownership and the foursquare policy for food security under good governance is also essential to ensure the business continuity in monsoon Asian counties.

End Notes

1. This paragraph and the following paragraphs primarily rely on the explanation on the NOSAI homepage.
2. Potato, soybean, red bean, butter bean (haricot), sugar beet, sugar cane, tea (first reaping), buckwheat, sweetcorn, onions, pumpkin, sericulture (cocoon).
3. Dairy cow, grazing cow, horse, breeding pig, fattening pig.
4. Oranges, apple, pear, grape, persimmon, chestnut, *ume* plum, plum, loquat, peach, kiwi, pineapple.
5. Mahul and Stutley refer to insurance pool mainly as the pool of capital, but in this paper pool has much wider meaning and includes social capital. The pool comprises of central and local governments, local communities, people and mutual relations among them. These could have latent capacity to drive forward the capacity development and human resource development for establishing and operating agricultural insurance scheme. This pool can be expected to facilitate the improvement of risk information, risk awareness, insurance culture and regulatory framework.
6. Cattle and horses can be compulsory when a farmer becomes a policy holder of the rice, wheat and barley program and the association decides that participation is compulsory.
7. In the case of paddy, the average insurance rate was 0.44% (= (0.005/0.571)/2=0.0044). At the initial stage of rice insurance in Indonesia in 2015 and 2016, for example, the insurance rate was nominally 3% but the farmer's actual rate was 0.6%. Its 80%, namely 2.4%, was subsidized by the government. Indonesia seems to have drawn upon the case

of Japan when it launched rice insurance scheme. But the rate was nearly 40% higher than that of Japan, although the participation was not compulsory in Indonesia. This higher rate could be a reason why the rice insurance scheme in Indonesia still cannot gain popularity. This insurance rate (calculated by the Damage Rate over the Loss Ratio) is considered to be a certain reference that implies the feasibility, sustainability or farmers' acceptancy of the insurance scheme.

8. Pasaribu's paper is of reference to understand the recent development of agricultural insurance in Indonesia where an agricultural insurance for paddy farming has been implemented since 2014 (Pasaribu, 2014).

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Appendix 1. Records of Agricultural Insurance in 2015

		Insured (‘000 household)	Insured Area/ Head (‘000ha/ ’000head)	Share of insuring (%: area / head-count base)	Total amounts of insurance (‘00 million yen)	Premiums (’00 million yen)		
						Total	Government paid	Farmers paid
Rice, wheat and barley insurance	Paddy rice	1,442	1,463	92.3	10,157	93	47	47
	Upland rice	0.1	01	5.1	0.2	0.02	0.01	0.01
	Wheat and barley	44	268	97.7	1,101	104	55	48
	Total	1,486	1,731		11,258	197	102	95
Livestock insurance	Dairy cattle	15	2,156	92.5	3,001	366	180	186
	Beef cattle	45	2,185	67.1	3,674	187	87	100
	Horse	2	21	60.2	201	7.0	3.0	4.0
	Breeding pig	0.8	201	24.4	98	3.0	1.0	2.0
	Fatting pig	0.6	1,825	24.6	203	18	7.0	11.0
	Total	63	6,388		7,177	581	278	303
Fruit and fruit-tree insurance	Fruits	61	38	24.2	967	43	22	22
	Fruit-tree	2	1.0	3.4	52	0.5	0.3	0.3
	Total	63	39		1,019	44	22	22
Upland crops insurance	Crops	74	289	70.0	1,996	129	71	58
	Silk-cocoon	0.2	(‘000 box) 2.6	14.1	1	0.03	0.01	0.01
	Total	74	-----	-----	1,997	129	71	58
Greenhouse insurance		208	23		6,667	64	31	33
Total		1896	-----	-----	28,119	1,014	504	510

Source: MFAA

Appendix 2. Indemnities of Agricultural Insurance in 2015

			The number of damaged farmers ('000 farmers/ heads, contracts)	Indemnities (million yen)	Reinsurance: Indemnities subsidized by the government (million yen)	Loss Ratio (Indemnity/ Premium)	Damage Rate (Indemnity/ Insurance) (%)	Premium Paid by Farmers (Average/10a, head, box, or house)
Rice, wheat and barley insurance	Paddy rice		51	5,306	1,065	0.571	0.5	636
	Upland rice		0.03	3	1	1.500	15.0	na
	Wheat and barley		15	2,833	92	0.272	2.6	3868
	Total		66	8,142	1,158	0.413	0.7	
Livestock insurance	Life insurance (thousand heads)	Dairy cattle	149	18,611	9,305	0.978	11.9	16,992
		Beef cattle	58	7,404	3,710	0.923	4.7	8,544
		Horse	1	461	230	0.961	3.3	na
		Breeding pig	4	196	98	0.820	2.5	943
		Fatting pig	173	1,489	745	0.827	7.3	974
		Total	385	28,161	14,088	0.955	7.7	
	Health insurance (thousand contract)	Dairy cattle	1,323	17,182	3,511	*	*	*
		Beef cattle	1,051	9,860	1,857	*	*	*
		Horse	14	212	33	*	*	*
		Breeding pig	7	50	10	*	*	*
		Fatting pig	--	--	--	*	*	*
		Total	2,395	27,304	5,411			
Fruit and fruit-tree insurance	Fruits		16	4,928	2,452	1.146	5.1	Apple fruits 7,110
	Fruit-tree		0.2	48	1	0.960	0.9	
	Total		16	4,976	2,453	1.131	4.9	
Upland crops insurance	Field crops		21	5,219	2,015	0.405	2.6	Potato 2,364
	Sericulture		0.02	1.5	0.5	0.500	1.5	1,008
	total		21	5,220	2,016	0.405	2.6	
Greenhouse insurance ('000 houses)			27	3,316	511	0.518	0.5	Glass 9,497 Plastic 7,457
Total			--	77,119	25,637	0.761	2.7	

Source: MAFF and author's processing.
Note *: Health insurance for livestock is combined with life insurance for livestock.