Reyes, Celia M.; Agbon, Adrian D.; Mina, Christian D.; Gloria, Reneli Ann B.

Working Paper

Agricultural insurance program: Lessons from different country experiences

PIDS Discussion Paper Series, No. 2017-02

Provided in Cooperation with:
Philippine Institute for Development Studies (PIDS), Philippines

Suggested Citation: Reyes, Celia M.; Agbon, Adrian D.; Mina, Christian D.; Gloria, Reneli Ann B. (2017) : Agricultural insurance program: Lessons from different country experiences, PIDS Discussion Paper Series, No. 2017-02, Philippine Institute for Development Studies (PIDS), Quezon City

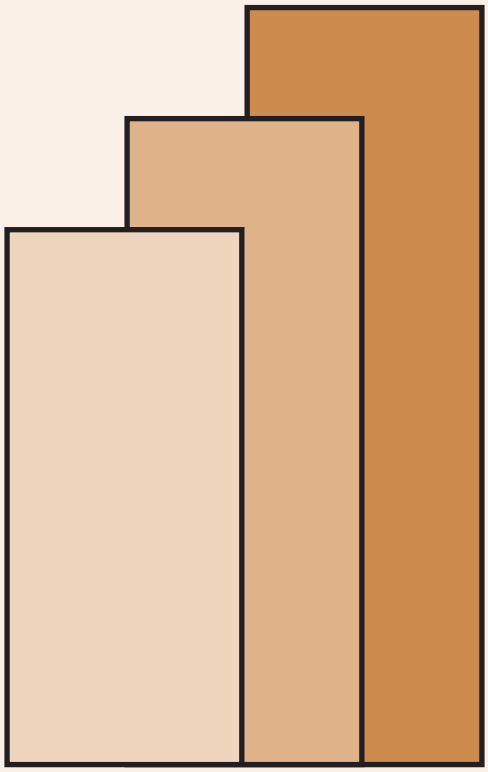
This Version is available at:
http://hdl.handle.net/10419/173579

Philippine Institute for Development Studies
Surian sa mga Pag-aaral Pangkaunlaran ng Pilipinas

Agricultural Insurance Program: Lessons from Different Country Experiences

Celia M. Reyes et al.

DISCUSSION PAPER SERIES NO. 2017-02



January 2017

For comments, suggestions or further inquiries please contact:
The Research Information Staff, Philippine Institute for Development Studies
18th Floor, Three Cyberpod Centris – North Tower, EDSA corner Quezon Avenue, 1100 Quezon City, Philippines
Tel Numbers: (63-2) 3721291 and 3721292; E-mail: publications@mail.pids.gov.ph
Or visit our website at http://www.pids.gov.ph

Agricultural insurance program: lessons from different country experiences

Celia M. Reyes, Adrian D. Agbon, Christian D. Mina, and Reneli Ann B. Gloria[1]

Abstract

While agricultural insurance has long been considered as risk management tool for farmers in both developing and developed economies, policy directions toward sustainability vary across countries. Reviewing the literature provides comprehensive view of the relevant issues namely; objectives of the program, credit access by the farmers, program costs, and premium subsidies provided by the national and local governments. This paper provides insights on how agricultural insurance programs from selected developed and developing economies were implemented. Learning from different country experiences, agriculture insurance is important yet costly to implement. Private insurance companies complement with the government run insurance company to improve coverage rates. Targeting eligible beneficiaries is crucial in the success of a highly subsidized agriculture insurance especially in developing economies.

Key words: agricultural insurance, crop insurance, developed economies, developing economies

[1] The authors are Senior Research Fellow of the Philippine Institute for Development Studies and Supervising Research Specialists. The authors gratefully acknowledge the research assistance of Ma. Blesila D. Mondez and Ronina D. Asis. Views expressed here are those of the authors and do not necessarily reflect those of the institutions they are a part of.

1 Introduction

As many of the world's poor households are living in environments where risk is a daily reality, agricultural insurance is reemerging as a topic of interest to farmers, policy makers, insurance companies, and development finance institutions. These risks[2] *(table 1 below)* particularly affect agricultural production from year to year due to unforeseen weather, disease/pest infestations, and/or market conditions causing wide swings in yields and commodity prices. Farmer's livelihood is highly susceptible to weather and price variability. As a result, it adds to their already vulnerable conditions of loss of income and hinders the poor rural households from investing more on social capital thus perpetuating the cycle of poverty. Wenner (2005) stressed that, producers in developing countries are exposed to weather vagaries and have little access to formal agricultural insurance products that would allow them to transfer production risk to other parties. In the same light, Wenner and Arias (2013) discussed that when the swings significantly reduce income in the short-term, there can be serious repercussions in the absence of effective risk management tools, especially when those swings are systemic shocks to the whole sector. The negative shocks, for example, can affect farmer's ability to repay financial obligations and lead to a loan default. Lending institutions may then be less inclined to extend loans to this sector in general due to high probability of loan default. The inability to easily access external financing over times limits farmer's abilities to expand, diversify, and modernize their agriculture activities. Furthermore, Hill (2010) mentioned that when households have little access to insurance, weather shocks not only have a direct effect on welfare when they occur, they also impact the decisions poor households make about their livelihood. The expectation that something bad may happen affects household behavior, causing households who are unprotected to avoid expending effort on risky activities, and to avoid putting their money into irreversible investments, keeping liquid assets instead. Enabling poor households to better deal with shocks is thus essential to both improving their welfare in the short run and improving their opportunities for income growth in the long run.

Wenner (2005) argued that agricultural insurance is reemerging as a topic of interest, especially in light of the need to improve agricultural competitiveness in increasingly integrated commodity markets. With this, is a strong rationale for providing public support to poor households on both equity and efficiency grounds. By increasing access to assets and to provide transfers when shocks occur, social protection programs can play an important role in insuring poor households (Hill and Torero, 2009). However, the challenge is how to

[2] For a thorough discussion of risks please refer to the report of Olivier Mahul and Charles Stutley entitled Government Support to Agricultural Insurance Challenges and Opportunities for Developing Countries, World Bank, 2010. Mark Wenner also has a thorough discussion of risks in his paper, Agricultural Insurance Revisited: New Developments and Perspectives in Latin America and the Caribbean, 2005.

overcome obstacles and deliver efficient and sustainable agricultural insurance products. The principal obstacles include lack of high quality information, inadequate regulatory frameworks, weak supervision, lack of actuarial expertise, lack of professional expertise in designing and monitoring agricultural insurance products, a mass of low-income, dispersed clients, who may not be willing or able to pay actuarially sound premiums for multiple peril products, and the tendency of governments to undermine market development through inappropriate use of subsidies and disaster relief funds.

As Mahul and Stutley (2010) put it, governments tend to alleviate the effects of crop failures or other disasters by providing post disaster direct compensation as a relief measure. This poses a "Samaritan's dilemma," whereby post disaster aid discourages programs such as insurance, which provide more-efficient financial solutions and reduce the magnitude of losses from future events. The authors further added that an important supply-side impediment to the provision of agricultural insurance in developing countries is the lack of infrastructure support for agricultural insurance. Government could create these public goods, such as agricultural and weather databases and crop risk models, providing domestic agricultural insurers with reliable data and quantitative tools to better assess their catastrophe risk exposure and thus design actuarially sound agricultural insurance products. The rhetoric underlying such policies often invokes the "Jeffersonian ideal" view of agriculture, which argues that agriculture deserves favored political treatment because of its inherent goodness.

Table 1 Classification of risk facing agricultural producers

Type of Risks	
Natural Disaster/Climatic	Hail, frost, drought, wind , fire, snow, pest infestation, flood
Geological	Earthquakes, volcanic eruptions
Sanitary	Plagues, diseases
Price	Commodity, inputs, exchange rates
Financial	Interest rates
Operational	Availability of inputs, evolution of production technologies
Environmental	Pollution, deforestation
Policy	Public subsidies, agricultural policy
Health	Illness, injury, disability, epidemic diseases
Property	Fire, theft

Sources: Zorilla (2002), Holzmann & Jorgensen, 2000

The remainder of the paper is organized as follows. After discussing the brief history of agriculture insurance in section 2, we delve into the agriculture insurance programs of selected developed and developing economies in section 3. Section 4 sheds light on the role and issues faced by governments in providing subsidies in agricultural insurance. Finally, section 5 outlines the learning points and concludes the paper.

2 History of agricultural insurance

Crop and livestock insurance has a long history: early insurance schemes were offered in Germany as early as the late 1700s. By the late 19th century many European countries as well as the United States had crop insurance schemes, mainly against hail. Government involvement started in the late 1930s already in the United States when the federal crop insurance was first authorized in Title V of the Agricultural Adjustment Act of 1938. Starting in the 1950 agricultural insurance schemes was first set up in developing countries. Between the 1950s and the 1980s a number of public sector (multi-peril crop insurance) MPCI schemes were established in Latin America (for example, Brazil, Costa Rica, and Mexico) and Asia (for example, India, the Philippines), often linked to seasonal production credit programs for small farmers (Kerer, 2013).

Mahul and Stutley (2010) provide a thorough discussion on the origins and trends of in the provision of agricultural insurance. The authors mentioned that, between the 1950s and the end of the 1980s, there was a major growth in public sector MPCI in Latin America (Brazil, Costa Rica, Ecuador, Mexico, and Venezuela) and Asia (India and the Philippines), often linked to seasonal production credit programs for small farmers. In Western Europe national programs for subsidized MPCI were introduced in Portugal and Spain in 1980. In the former Soviet Union, public sector MPCI was implemented on state farms. Many of these public sector programs had high operating costs and very high loss ratios, which were exacerbated by the levying of very low premium rates and poor management. In Latin America, most public sector programs were terminated by 1990 because of their poor results. In India, the Philippines, Portugal, Spain, and the United States, various measures were introduced to strengthen and reform national programs.

In the report of the Food and Agriculture Organization (2011), the earliest agricultural insurance programs in Asia and the Pacific region date back more than 75 years and include Japan, which has a very large and government subsidized cooperative crop and livestock insurance program and Australia and New Zealand, which have the largest private commercial crop, forestry and livestock insurance sectors in the region. In the same report, the national programs in India and the Philippines have continued up to today, and in China, where People's Insurance of China (PICC) formerly enjoyed a near monopoly over crop insurance up to the 1990s, the Chinese government embarked on a major program to promote decentralized agricultural insurance in 2006, and there is now a much larger number of national and provincial commercial crop insurance companies.

Wenner and Arias (2013) discussed that historically, private crop insurance in developed countries has been limited to single peril products, namely, rain/hail insurance, for which it is possible to set actuarially sound premiums and easy to verify damages and losses. Government has used the inability of private insurers to offer affordable insurance products, especially in the multiple peril and catastrophic loss insurance market segments, as a justification to enter as a direct or indirect insurance provider. The experience of government-backed programs generally has not been positive in terms of economic

soundness but area coverage has been good.[3] The government programs have been characterized by high actuarial losses and high subsidy outlays.

The model of crop insurance followed in a number of high-income countries, such as the U.S. Spain, France, and Italy is for the central government to provide:

(i) Subsidies on premiums to farmers;
(ii) Operational subsidies to private insurers to cover some of the high administrative costs associated with agricultural insurance contract underwriting; and
(iii) Subsidized reinsurance.

Moreover, once government insurance programs exist, it is difficult for private companies to innovate and introduce new risk management products. On the positive side, government backed insurance programs have served as a substitute means of transferring payments to farmers and maintaining farm income levels in a post-Uruguay Round of Trade Negotiations policy regime wherein all signatories to the agreement are supposed to reduce and phase out direct support payments to farmers. To replicate the reigning model of crop insurance found in developed countries in a developing country context, characterized by recurrent public deficits and extreme concern with managing inflation and rationalizing public expenditures, would be imprudent and ill advised.

Since the 1990s, the trend has been for governments to promote agricultural insurance through the private insurance sector, often backed by government financial support (public-private partnerships [PPPs]). Following the break-up of the Soviet Union in 1990, many of the state-owned monopoly agricultural insurers in Eastern Europe were privatized, and markets were opened up to competition by new private commercial companies providing crop and livestock insurance policies. In the United States, the FCIP's MPCI program is implemented through 17 private insurers or managing general agents. In Latin America, new private commercial agricultural insurance was introduced in Brazil, Chile, and Ecuador during the last decade (Mahul and Stutley, 2010).

As previously mentioned the agricultural insurance markets were initiated in Europe over 200 years ago in the form of privately offered protection against livestock mortality and named peril events such as crop-hail. Yet, only in the last 50 years has there been a rapid expansion and development in the range and scope of insurance products offered to producers. Most of this expansion is accounted for by an extensive range of government supports, including subsidized premiums, subsidized delivery and loss adjustment expenses, and the public provision of reinsurance services. Table 2 below shows the top ten countries with the biggest subsidies to both livestock and crop insurance in 2007. In absolute terms, the three countries that heavily subsidized agricultural insurance in 2007 were; the US, this is 64 percent of the total premium of the top ten countries ($8.5 B), Japan with 8.3 percent ($1.1 B) and Canada with 8.2 percent ($1.09 B). In terms of premium subsidy, still the US accounts for 59 percent

[3] The percentage of total area cultivated that is insured in selected developed countries are as follows: US-45.89%, Canada-54.73%; Spain-42.52%; and Japan-79.31% in 2000. Source: Agroasemex .

or 3.8 billion dollars. This is followed by Spain at 8.9 percent or 581 million dollars and Japan with 8.5 percent premium subsidy or 546 million dollars.

Table 2 Top 10 Providers of Livestock and Crop Agricultural Insurance Premium Subsidies in 2007
(in Millions of dollars)

Country	Premium	% to prem	Premium Subsidy	Premium Sub as % of total prem	% to total prem sub
US	8,511	63.62	3,823	0.45	59.18
Spain	809	6.05	581	0.72	8.99
Japan	1,111	8.31	549	0.49	8.50
Canada	1,090	8.15	546	0.50	8.45
Italy	383	2.86	280	0.73	4.33
China	682	5.10	283	0.41	4.38
Russian Fed	315	2.35	156	0.50	2.41
Iran, Islamic Rep	241	1.80	146	0.61	2.26
Mexico	142	1.06	62	0.44	0.96
Korea, Rep of	93	0.70	34	0.37	0.53
Total	13,377	100.00	6,460	0.48	100.00

Source: Mahul and Stutley, 2010, authors' calculations
Notes; columns 3 and 6 were added from the original table of Mahul and Stutley. The original table also contains separate columns for livestock and crop insurance.

3 Agricultural insurance in selected developed and developing economies

The next section discusses the overview of agricultural insurance in selected developed and developing economies. Table 3[4] below shows the selected countries' availability of crop and livestock insurance with and without subsidies from the governments. There are seven identified developed economies that do not give subsidies in their agriculture insurance namely Australia, Germany, Greece, Hungary, New Zealand, Sweden, and The Netherlands. However, many developed economies also give subsidies to their insurance program, notably the USA, Canada, Austria, and Switzerland among others.

Table 3 Availability of crop and livestock insurance in selected developed and developing economies

Country	Crops *(peril)*	MPCI	Revenue	Live stock	Index-based
Unsubsidized					
Australia	x			Mortality	
Germany	x	x		All risk	
Greece	x			All risk	
Hungary	x			Mortality	

[4] Not all of the countries' agriculture insurance program will be discussed in this paper. A more exhaustive report can be found in FAO, 2011 Agricultural insurance in Asia and the Pacific region. Food and Agriculture Organization, Bangkok, Thailand and Mahul, Olivier and Stutley, Charles. 2010. Government Support to Agricultural Insurance Challenges and Opportunities for Developing Countries, World Bank

New Zealand	x			Mortality	Crops
Sweden	x		x	Mortality	
The Netherlands	x			Mortality	
Subsidized					
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
Malawi	x				Crops
Ethiopia	x				Crops
Thailand	x				Crops
Vietnam	x				Crops
Uganda	x				Crops
India	x				Crops
Sub-Saharan Africa	x				Crops
Kenya				Mortality	
Mongolia				Mortality	
Nepal				Mortality	

Sources: Mahul and Stutley, 2010; Glauber and Smith, 2012; authors' compilations

Australia[5]

Australia's agriculture insurance can be summarized into two broad categories: the traditional and newer index based insurance. The traditional insurance include the named peril, multi-peril crop, crop revenue, and mutual funds or known as farmer pool. The index based products are the weather derivatives, yield index and the area yield index.

Historically, the agriculture insurance in Australia is considerably old as it was established in 1918 and is considered to be every well developed and very competitive according to the report of the FAO in 2011. Named peril insurance products are common in Australia, with a number of companies providing insurance against hail, frost and fire risks. Attempts to

[5] This part heavily draws from the report of Hatt, M, Heyhoe, E & Whittle, L. The paper is entitled, Options for insuring Australian agriculture, ABARES report to client prepared for the Climate Change Division, Department of Agriculture, Fisheries and Forestry, Canberra, September, 2012

introduce MPCI mutual fund schemes in Australia have been unsuccessful. Index-based products have recently become available, but uptake has been limited.

Significant expansion of the program began only in the 1960 until in 1974–75 Wesfarmers and Western Underwriters offered an area yield guarantee scheme for Western Australian growers. Growers could also nominate cover for less than the 75 per cent of average shire yield at a reduced premium. The scheme suffered from poor take-up by farmers and had insufficient reliable individual farm data on which to base premiums. As a result, the scheme suffered badly from adverse selection, with farmers who never made 75 per cent of the yield average keen to take on the scheme, while other farmers who never fell below this level had no incentive to take up the scheme (Hatt, M., Heyhoe, E., and Whittle, L., 2012).

In 1999 to 2000, there were more insurance products offered by Growers' cooperative CBH and insurer AON. One of these is the crop failure insurance that provided for a nominated value per hectare that represented the cost of replanting the crop the following season. Another is the sprouting downgrade insurance that covered the downgrading of grains due to the sprouting of grains in the heads caused by wet weather prior to harvest. In this case, farmers were paid the difference in value between the intended grade of delivery and the grade it was eventually accepted into. In the early 2000 weather derivatives were introduced to Australian farmers. This is based on rainfall and temperatures at weather stations across the country.

Another innovation in Australia's insurance is the YieldShield. This is a relatively new product offered by Primacy Underwriting Agency starting in 2009 up to present. Yieldshield combines traditional named peril insurance for hail and fire insurance with yield index insurance that covers against insufficient or excessive rainfall water stress, for wheat and grain sorghum. YieldShield's water stress insurance attempts to overcome the problem of a lack of farm-level yield data by utilizing crop simulation models to estimate farm level yield.

Another insurance scheme which was based on the cost of production cover was also introduced in April 2011. This is a trial mutual fund scheme for wheat and barley growers in Western Australia. This scheme allowed participating growers to cover their production costs if their yield fell below pre-specified levels. This was intended to cover growers against natural events, including drought, frost, hail, flood and fire risks. Because of the extensive grower records, they are able to develop premiums on an individualized level based on the production history thus reducing adverse selection issues.

Another notable development in Australia's agricultural insurance is the CelsiusPro Australia which started operations in 2012 until at present. The company specializes in structuring and originating weather derivatives. Celsius Pro's weather derivatives are based on a weather index derived from measurements at several hundred official Bureau of Meteorology weather stations across Australia. A wide variety of certificates are available for agriculture, including:

1. rain day certificate—pays out a pre-defined amount for every day the daily rainfall is above farmer specified level
2. dry day certificate—pays out a pre-defined amount for every day the daily rainfall is below farmer specified level
3. frost day certificate—pays out a pre-defined amount for every day the daily minimum temperature is below farmer specified level
4. heat day certificate—pays out a pre-defined amount for every day the daily maximum temperature is above farmer specified level
5. dry season certificate—pays a pre-defined amount for every millimetre if the cumulative
6. rainfall during a particular period is below farmer specified level up to a maximum amount
7. rain season certificate—pays a pre-defined amount for every millimetre the cumulative
8. rainfall during a particular period is above farmer specified level up to a maximum amount
9. Dry-spell certificate—pays a pre-defined amount for every dry day occurring within a dry spell. A dry day is defined as a day for which the daily rainfall was below a specified threshold. A dry spell is defined as a minimum number of consecutive dry days.

The major advantage of the weather certificates is that claims do not need to be assessed. Once the event occurs there is an automatic payout based on the data received from Bureau of Meteorology (BOM). The data is independently sourced from the BOM who is the arbitrator in any dispute. Weather basis risk can occur between stations which need to be noted by the person looking at these types of strategies, CelsiusPro Australia suggested the government could play a role in the construction of more weather stations to reduce basis risk.

Some of the private insurance companies that operate in Australia are Rural Affinity and WA Farmers which has been working closely with Australian Reliance in providing insurance products to farmers. Rural Affinity[6] is owned jointly by Corion (a fully owned subsidiary of the Munich Reinsurance Company) and the executive directors of the business. Rural Affinity is a specialist agricultural insurance agency providing products to the crop, plantation timber and livestock industries in Australia and New Zealand. The specific products are Boradacre, Livestock, Olive and Nut Crop, Plantation Timber Aus and NZ, Cotton, Farm Pack, Viticulture, Small Farm and Fruiting Trees.

The Australian Reliance[7] is a Western Australian owned and operated Insurance Broker.
Some of the services offered by WA are;

a) Multi-peril Crop Insurance (Cropsure) - this policy protects the farmers from financial loss as a result of weather events, disease and insect pest infestation. Unlike other insurances that protects against loss of income, Cropsure provides cover for operating costs including, but not limited to, seed, fertilizer, chemicals, field operations, fuel, freight inwards and contract costs.
b) A Complete Package- the package also includes: Traditional Crop Insurance including Fire and Hail, Farm Insurance, Motor Vehicle, Home Building Contents, Credit Insurance, Life Insurance

Australia's delivery channels are through brokers who are considered the most important in the delivery channel. Producer associations, cooperatives and banks are crucial in the

[6] Basic information obtained from this website http://ruralaffinity.com.au/
[7] Discussions were from this website , but did not include those not related to crop/agri insurance http://australianreliance.com.au/industry/wa-farmers-insurance-package/

linkages between the farmers and the insurers. Crop and livestock insurance is voluntary as there is no form of public support for agricultural insurance in this country.

The National Rural Advisory Council (NRAC)[8] Australia, in its assessment 2012 report puts an emphasis the role of government to assist Australian agricultural industries to become more self-sufficient and better at managing weather related impacts on production through providing better and more standardized data.

Sweden[9]

Crop insurance was first introduced in Sweden in 1928 and livestock insurance in 1890. In 1952 Sweden introduced the first area-yield index crop insurance scheme, but this was subsequently terminated. The crop insurance program in Sweden started in 1961 and was compulsory, similar to that in Japan. Insurance "premia are paid as levies on farm deliveries" and the Swedish government provided "a subsidy of more than double the farmers' contribution." During the 1960's, many farmers were not satisfied with the crop insurance programs, albeit having a loss ratio of 1.78, primarily because individual farmers' losses are not always indemnified (Wright and Hewitt, 1993). During the 1961 to 1987 period, agricultural insurance was supervised by the government and was mandatory for farms with more than two hectares. Government crop insurance covered large losses, and the average deductible was 15.5 percent. The system was abolished in 1987 and was replaced by a disaster aid program in case of total crop loss. The disaster aid program was administered by the Federation of Swedish Farmers. This system was abolished in 1994.

Currently, agricultural production is regarded as any other sector of the national economy. The governmental risk management framework in Sweden has moved towards less government involvement. Assistance tools for agriculture in Sweden are limited to disaster relief, and this includes few regulated measures and some ad hoc assistance. Today, agricultural crop and livestock insurance is provided by three private mutual insurance companies. The agricultural insurance market is dominated by Lansforsakringar with its subsidiary company Agria. Its market share is estimated at 80%-85%. The other insurance company Dina underwrites approximately 10%-15% of the agricultural insurance market. Both insurers have regional insurance subdivisions (companies) working in close cooperation within their conglomerates.

The delivery channels for agriculture insurance are the producer and coop associations. It can also be said that the there is high penetration rate of between 60-80 percent among farmers and is voluntary in nature. Agriculture reinsurance is done by the private players and thus no form of government support exists.

[8] Feasibility of agricultural insurance products in Australia for weather-related production risks, September 2012.
[9] This section draws from the ANNEX E report of the World Bank survey on Agriculture Insurance in Developing Countries in 2008.

New Zealand[10]

Livestock insurance started in 1970s while crop insurance started expanding significantly after 1981, although it existed for cereal crops prior to that date. Four private sector insurers and one mutual insurer offer both crop and livestock insurance. One private company offers only livestock insurance. New Zealand has no public sector insurance. The Lloyd's of London is also licensed as a direct insurer and offers equine and livestock insurance through three facilities. Forestry insurance is also offered.

The private sector reinsurance is well developed in New Zealand and perhaps it in this reason that there is no form of public support for agricultural insurance in New Zealand. So there are no premium subsidies on agricultural insurance in New Zealand. Moreover, hail insurance is being offered and insurance policies are also being developed for different fruits and vegetables. Livestock insurance that covers accident and mortality is also offered in this country. Other important insurance program includes; forestry and aquaculture. Yield based insurance is available but are not actively marketed according to the FAO report.

Generally, crop insurance in New Zealand is also voluntary but compulsory to kiwi fruit industry as decided by the industry association. The most important delivery channels are the insurance brokers, producer associations for certain crops specially the fruit sector. Accordingly, there are no premium subsidies on agricultural insurance in this country. Although not very updated, the penetration rate is only five percent of the farmers were insured in 2007. The reported average loss ratio in the FAO report is fifty percent for crop insurance including forestry.

Spain[11]

In Spain, agricultural insurance policy is decided centrally providing guidelines to autonomous regions, which can apply it to suit their own needs. Before 1978, the agricultural insurances were managed exclusively by private companies. They only offered coverage against damaged caused by hail and fire in crops (mainly in cereals), because they considered that the rest of natural risks did not have the conditions as to be considered insurable. As a consequence, when the agricultural sector suffered damages by those non-insurable risks, the Government felt obliged to establishes adequate measures to support the affected farmers. In 1980 the government enacted legislation to create a national agricultural insurance program, termed the Combined Agricultural Insurance *(Seguros Agrarios Combinados)* Program, a public-private partnership underwritten by Agroseguro, a private Coinsurance Pool with a mandate to provide subsidized agricultural insurance to all of Spain's regions and farmers on

[10] This description was obtained from the FAO report of 2011.

[11] Interesting discussions on the Spanish agricultural insurance can also be found on this website http://ec.europa.eu/agriculture/analysis/external/insurance/annex24_en.pdf

a voluntary basis. In 2008 Agroseguro was Europe's largest and most comprehensive national agricultural insurance program, underwriting more than 200 different crop, livestock, aquaculture, and forestry programs and generating annual premiums in the order of USD 800 million.

It can be noted that the Spanish government has explicit plans for agricultural insurance. The Government establishes annually, by means of a specific "Plan", the framework of the tasks to perform during the economic year. The objectives searched with the application on the agricultural insurance system are materialized in the offering to the farmers a tool which contributes to the stabilization of their revenues when their farm productions are affected by the consequences of non-controllable natural phenomena. The "Agricultural Insurances Annual Plan" constitutes the normative by means of which the Government defines every year the advices to be held into account in the application of the agricultural insurance. The Plan contains and expresses the compromise from the Government not to bestow extraordinary aids to the farmers affected by damages on production caused by insurable risks.

Over the past 28 years Agroseguro has designed, tested and, once approved, then introduced into the market more than 200 different crop, livestock, forestry, and aquaculture products. The company offers a comprehensive range of named-peril and multi-peril crop insurance policies and a wide range of livestock insurance covers for cattle, sheep, and goats, and both freshwater and marine aquaculture policies.

The main characteristics of the Spanish agricultural insurance system are the following:

•The participation of farmers in the system is voluntary

• There are subsidies from the public administrations. The average subsidy is the 50% of the total insurance premium. From this percentage, the 40 % comes from ENESA and the rest (10%) comes from the Consejerias de Agricultura of the regional governments (Comunidades Autonomas). Subsidies positively discriminate some groups, such as: professional farmers, priority holdings (according to the 19/1995 Law, of July 4th), OPFH's members, young farmers and women farmers.

• In all the insurance contracts deductibles are applied. They can be straight deductibles or coinsurance deductibles. They can also be applied per crop or for the whole farm.

• Indices are used for the coverage of some risks. This insurance modality is of limited importance.

• The damage appraisal and the determination of the indemnity is carried out by freelance experts which have a contract with Agroseguro. In the loss adjustment process, there are usually two visits to the field, one after the communication of the damage, and a second one at harvest time. The insured must be present to manifest his agreement or disagreement with

the loss adjustment results. In the case of index insurance, satellite images are used as reference for the damage quantification.

• According to the current legislation, in the crop productions, indemnities must be paid within 60 days from the expected harvest date. For the livestock production this delay is reduced to 40 days from the date of the damage.

Germany

As of 2006, there is no developed agricultural insurance in Germany[12]. Although there are two kinds of products are offered in the insurance market: the crop hail insurance and the livestock insurance. Crop hail insurance has a long history in Germany. This product was first introduced in 1733 and is mainly marketed by mutual insurance companies and cooperatives. Sixty percent of the total crop area in the country is insured against hail. Cattle insurance was introduced in Germany in 1830. Many mutual insurers have commercialized livestock insurance since the eighteenth century. Multi-peril crop insurance (MPCI) is also offered in Germany but is still undeveloped, mainly due to strict underwriting conditions.

In Germany, crop insurance is underwritten by mutual insurance companies, private insurance companies, and public insurance companies. The competition for crop insurance products on the German market is very active with about fourteen insurance companies offering hail crop insurance and only one offering MPCI. Moreover, livestock insurance is very important in Germany. There are two of insurance for this product line which is a private-public fund covering animal losses due to epidemic diseases. The second type is the product provided by the private insurance companies, which offers insurance against production interruption due to accidents, fire, epidemic diseases, and movement restrictions, among others.

Hail insurance is the most popular crop insurance product (crop hail with 8% franchise). Crops covered are: all arable crops plus vineyards, fruits plantations, and vegetables. Animal losses due to epidemic diseases and obligatory slaughter as well as culling and rendering costs in general are covered by the Animal Disease Fund. Livestock revenue insurance is available in Germany and widely accepted by the farmers. More than 50% of the farmers in Germany have a policy against consequential losses for animal diseases like foot and mouth disease and cow diseases.

The Federal government of Germany does not want to subsidize the agricultural insurance program as it would require annual funding. The primary reason cited is that the state already contributes funds to cover for especially during severe crises when payments can be made for damages from floods and droughts without entailing high administrative costs. Accordingly the state is willing to support equally all sectors of the economy and the farmers should be responsible for their crops. The state further stressed out that the insurance products in the

[12] Eckhard Engert, Federal Ministry of Food, Agriculture and Consumer Protection, during his presentation at the conference in Madrid dated November 2006. The website is http://www.agroinsurance.com/en/pratice/?pid=617

market can provide effective protection against major natural perils so there is no need in creating a special subsidized insurance program.

The United States of America (U.S.A.)

Federal crop insurance was first authorized by Congress in the 1930s but remained essentially an experimental program for many decades with limited availability in terms of crops and regions. The 1980 Federal Crop Insurance Act expanded insurance to many more crops and regions, reflecting Congress's vision of a program that provides protection for all farmers in all regions. The act set the framework for a public-private partnership through which private sector companies sell and service insurance policies while administrative and operating expenses incurred are reimbursed by the federal government (Du, Feng & Hennessy, 2014).

Smith (2012), described that between 1980 and 2010, the federal crop insurance program grew like a weed, both in scope (numbers of crops and geographic regions covered) and complexity (array of different products), mainly because of substantial increases in subsidies and congressional mandates. With the passage of Federal Crop Insurance Program[13] in 1980 by the US congress it made the insurance more affordable and accessible. This legislation was characterized by the introduction of a private-public partnership between the US government and private insurance companies. The major aim of this partnership is to bring the efficiencies of the private sector delivery system together with regulatory and financial support from the federal government. In 1994, the Federal Crop Insurance Reform Act increased subsidies and expanded the allowable scope of insurance products. With the new reformed insurance act the Risk Management Agency was created in 1996. In May 2000, the Agricultural Risk Protection Act (ARPA) further increased subsidies, further expanded the potential array of products, and required that the Risk Management Agency (RMA) introduce a crop cost-of production product and products that cover livestock. In addition, the 2008 Farm Bill required farmers who wanted to be eligible for the new Supplemental Revenue (SURE) standing disaster aid program for crops to purchase subsidized federal crop insurance. The 2008 Farm Bill also expanded a "508h" process (introduced in the 2002 Farm Bill) that, through private initiatives, now allows farm groups and insurance companies to seek funding for developing other new agricultural insurance policies for which premium subsidies may be provided.

Smith (2012), further argues that insurance program in the US is very costly as the federal government provides explicit and implicit subsidies to support agricultural insurance in the United States. The subsidies take three forms. First, as discussed above, producers receive a premium-rate subsidy, which varies by class of product and by level of coverage within products. Second, insurance companies are given a subsidy for administration and operations (A&O) expenses, which varies by product, but which, for any given insurance product, is defined as a fixed proportion of the total premium associated with each policy. Third, the

[13] http://www.cropinsuranceinamerica.org/about-crop-insurance/history/#.VTYy_fmUcXw

federal government acts as a reinsurer in two ways: by providing overall stop-loss coverage and, to some extent, copayments for losses on each company's aggregate book of business and by accepting most of the risk for policies placed in an assigned risk fund. As a result, the government increases underwriting gains for the private insurers and, therefore, provides additional subsidies to the program, in this case targeted to the agricultural insurance industry.

In 2014, Farm Bill[14] or the Agricultural Act of 2014[15] accelerates the evolution from the traditional farm price and income support to risk management in the US agriculture program. This Farm Bill of 2014 is considered the centerpiece of the US agriculture safety net that solidifies crop insurance as the primary tool for farmers in the dealing with production and price risk. This is an improvement from the 2008 Farm Bill's direct and countercyclical payment programs and the state based revenue program which were eliminated. Starting 2014, a farmer may choose one of two new farm programs which are the price loss coverage and agriculture risk protection. The former program makes a payment to a producer when the market price for a covered crop is below a fixed reference price while the latter is a program that makes a payment when either the farm's revenue from all crops or the country's revenue for a crop is below 86 percent of a predetermined or benchmark level of revenue.

These two programs are designed to supplement crop insurance by providing support in periods of multi-year price declines and helping producers cover the crop insurance policy's deductible. Together these two farm programs are projected over time to spend substantially less than the programs they replaced.

Moreover, the 2014 Farm Bill[16] substantially strengthens crop insurance by adding several new products. It also requires a number of program revisions in order strengthen crop insurance's role as the primary component of the farm safety net in the US. Under Farm Bill 2014, two new-risk management programs were established to supplement crop insurance and protect farmers when they suffer significant losses. These are; Price Loss Coverage (PLC) Program that address sharp declines in commodity prices and Agriculture Risk Coverage (ARC) program which covers a portion of a farmer's revenue loss when crop prices fall to 86 percent of the historical benchmark. Another new program is the dairy margin protection program which was created to compensate farmers when national milk prices drop too feed costs. The amount of indemnity payment that a farmer receive from the US government depends on the annual coverage which is decided by the farmer. This program replaces the Milk Income Contract program and will likely result to higher in government support to help secure the income of the American dairy farmers. The 2014 Farm Bill strengthens the existing crop insurance program and even expands the scope to other products

[14] The complete text of the Farm Bill or the Agricultural Act of 2014 can be downloaded at this website http://agriculture.house.gov/sites/republicans.agriculture.house.gov/files/pdf/legislation/Final_AgAct2014.pdf . Title XI of the Farm Bill Act is Crop Insurance with sections 11001 to 11028.

[15] A thorough information about this can be found on this website of the US Department of Agriculture Farm Service Agency http://www.fsa.usda.gov/programs-and-services/farm-bill/index

[16] http://www.cropinsuranceinamerica.org/about-crop-insurance/just-the-facts/#.VTY2dfmUcXw

like organic and bio-energy crops[17]. The expansion also covers livestock diseases, specific production practices and business interruption. The major enhancement to crop insurance is the addition of two supplemental policies that will help producers expand their protection against losses due to natural disasters or price declines. These enhancements are categorized into Stacked Income Protection Plan (STAX) and the Supplemental Coverage Option (SCO). The STAX is for upland cotton acreage only which is an area revenue plan of insurance. This insurance plan covers revenue losses of not less than ten percent and not more than thirty percent of the expected county revenue. The indemnities for this product is paid based on the amount that expected county revenue exceeds actual county revenue as applied to individual coverage of the producer, except that indemnities may not include or overlap the producer's selective deductible. On the other hand, the SCO provides all crop producers with the option to purchase area coverage in combination with an underlying individual policy or plan of insurance that would allow indemnities to be equal to a part of the deductible on the underlying policy or plan of insurance. This product is available this year to spring barley, corn, soybeans, wheat, sorghum, cotton, and rice. SCO indemnities are triggered if area losses exceed fourteen percent of expected levels, with SCO coverage not to exceed the difference between 86 percent and the coverage level selected by the producer for the underlying policy. Thus, strengthening crop insurance is one of the major farm policy reforms of the Agricultural Act of 2014 through a public and private partnership that ensures the farmers invest in their own risk management.

Japan

The Japanese government has a deep commitment to the development of agricultural insurance. In 1929 the Livestock Insurance Act was enacted as a modern disaster relief measure. The National Forest Insurance Law was enacted in 1937 in order to compensate forest owners for damage by fire, weather impacts (wind, water, snow, drought, frost, tidal waves), and volcanic eruptions (FAO, 2011)[18]. The Crop Insurance Act was established in 1938 but it implemented a multiple peril crop insurance program in 1939 that provided nationwide coverage for paddy rice, wheat, barley and mulberries, and subsidized 15% of premium costs (Yamauchi 1986). Then in 1947 Japan adopted a yield insurance program similar to that of the U.S. The Japanese government had subsidized insurance premia (over 50%) and administrative costs. However, in contrast to that in the U.S., agricultural insurance in Japan had been compulsory for farms greater than three-fourths acre while coverage had been available on a plot basis.

The government provides approximately 50 percent premium subsidies. In addition, it acts as reinsurer of last resort for the whole agricultural insurance scheme. According to estimates from the Management Improvement Bureau of the Ministry of Agriculture, Forestry, and

[17] http://www.farm-europe.eu/travaux/how-to-tackle-price-and-income-volatility-for-farmers-an-overview-of-international-agricultural-policies-and-instruments/

[18] A thorough discussion of Japan insurance system can be found at the FAO 2011 report. The report also draws from the results of the survey by World Bank in 2008.

Fisheries of Japan, for the period from 1990 to 2005 the government of Japan spent, on average, US $640 million every year to subsidize 50 percent of the cost of agricultural mutual relief premiums (FAO, 2011).

The types of agriculture insurance in Japan[19] are categorized as national and optional programs. For the national program this covers rice, wheat, livestock, and barley insurance while for optional programs are fruit and fruit-tree insurance, field crop, sericulture and greenhouse insurance. Japan's strength on insurance are the associations that are formed to carry out the insurance programs in which members' houses and properties can also be insured. The main features of the agriculture insurance in Japan can be summarized in five key points. First, the government re-insures the scheme's projects excluding the farmer's house insurance. Second, the implementation of the projects is compulsory for the associations producing rice, wheat and barley and also to livestock. Third, as for the rice, wheat, and barley insurance, the participation of the farmers who cultivate either of the rice, wheat or barley in the fields over the specific acreage is compulsory. Fourth, a part of the premium which member farmers bear is paid by the government. And lastly, the government bears a part of the operational expenses of the organizations.

According to Japan's National Agricultural Insurance Association, the scheme starts as the local farmer's cooperative action to establish a joint reserve fund by accumulating the contributions as premium for the purpose of making up the loss, from which about 3 million farmers who are policy holders may suffer losses due to natural disasters. NOSAI or the Nogyo Kosai Saido is agriculture mutual aid system operated by the Agricultural Mutual Relief (AMR) Associations or municipal governments. When a natural disaster causes big losses to farmers over a large area and with risk cannot be adequately dispersed within the limit of local communities. The insurance program is operated as a device of dispersing risk in which the liabilities by the AMR associations and the municipal governments are reinsured by their prefectural federation. The federation's liabilities are re-insured by the national government. Accordingly, this agricultural insurance scheme aims to help stabilize farmers suffering from damages caused by natural disasters and contribute to the growth of the Japanese agriculture. This is also considered as the centerpiece of the government's measures for natural disasters in agriculture and financial assistance is provided from the government. The said scheme has been amended many times to meet the changing agricultural situation and contributed to the development of agriculture in Japan.

Malaysia

Malaysia's[20] agriculture insurance is considerably new. The country has never implemented a national agricultural crop or livestock insurance scheme. Since the 1980s there has been some limited private commercial insurance of plantation export crops including rubber, oil palm,

[19] The discussions are sourced from http://www.nosai.or.jp/nosai_kasou/nosai_eng_02.html
[20] FAO, 2011 report on Agricultural insurance in Asia and the Pacific region

coconut, fruit and cocoa. These crops have been insured under a forestry/plantation fire policy with additional perils.

In 2002, the National Insurance Association of Malaysia (NIAM) was invited by the government to establish a national agricultural insurance program. In 2004, NIAM with technical support from Partner Reinsurance Company, Zurich branch, designed proposals for a national paddy (rice) Multiple Peril Crop Insurance (MPCI) program. Although the program was well received by NIAM's members, the government and farmers, the program was not implemented because of the high premium rates.

Until 2008 there was no formal livestock or poultry insurance in Malaysia. Malaysia suffered catastrophe (uninsured) losses in swine under the Nipah virus outbreak of 1998/99 – in the absence of any form of livestock insurance the government partially compensated their direct losses (see further discussion below). On 31 January 2008 the Bank Negara gave approval for the formation of a poultry and livestock insurance scheme. It was agreed to form a pool that would be managed by Malaysian Re. On 5 February 2008 the Standing Committee invited NIAM members to establish a new Tani Malaysia scheme geared toward commercial livestock and poultry farms.

In 2009, plantation crops (rubber, oil palm etc.) have been insured under a forestry/plantation fire policy providing cover against the loss of the tree (standing asset) as a result of fire plus allied perils of flood, windstorm, and sometimes animal damage (e.g. elephants). FAO 2011, reported that there are no crop or livestock insurance products available in Malaysia and there are no weather index programs. There are no known government supports for agricultural insurance in Malaysia as of 2011.

At present, plantation crop insurance in Malaysia[21] is offered by the private sector and is also called as insurance for growing trees. This insurance is an added to the fire insurance policy that covers the industrial crops which are rubber and palm oil. In 2013, the Ministry of Agriculture recruited consultants to help plan and implement crop insurance in Malaysia that integrates crops, livestock, and other agriculture livelihoods under the same program in an integrated manner. With these developments, the government has allocated 0.99 billion US dollars for the project initiation and additional 0.44 billion US dollars for agricultural projects in palm oil, rubber, high-value herbs and paddy. Moreover, the Malaysian government added 1.9 billion US dollars to the Ministry of Agriculture and Agro-based industry in order to boost national income and to ensure the sustainability of food security.

Indonesia

The agricultural insurance in Indonesia is also relatively new. FAO report 2010, mentioned that there is no tradition of agricultural crop and livestock insurance in Indonesia[22]. Although for several decades large forestry and plantation and pulp paper companies have purchased

[21] S.V.R.K. Prabhakar, A. Abu-Bakar, C. Claudio, H.V. Hung. 2013. Promoting Risk Financing in the Asia Pacific Region: Lessons from Agriculture Insurance in Malaysia, Philippines and Vietnam. Hayama, Japan: IGES

[22] FAO, 2011 report on Agricultural insurance in Asia and the Pacific region

facultative forestry fire insurance fronted by local insurance companies and reinsured by a handful of UK and European specialist agricultural and forestry reinsurers.

Indonesia is very exposed to the ENSO-El Niño cycle and the acute droughts associated with the phenomenon, followed by excess rain and flooding. This coupled with concerns over climate change impacts on food production and security has led the Government of Indonesia in 2009/10 to introduce through the Ministry of Agriculture (MOA) two pilot agricultural insurance programs in West and Central Java, one offering MPCI crop insurance and the other livestock mortality and theft cover.

Under the 2009/10 MOA pilot crop and livestock insurance schemes, the government has financed 100 percent of the premiums. For the longer term, it is understood that the government is exploring three different models for agricultural insurance, namely: 1) fully government financed premium subsidies; 2) commercial insurance designed to link input suppliers and agribusiness with insurance companies; and 3) crop-credit linked insurance where farmers would be required to purchase insurance in order to access credit. Because the insurance program for agriculture is relatively new, the proposed delivery channels are through commercial and rural banks in the country.

In 2014, Indonesia's Agriculture Ministry[23] proposed to allocate 33.6 million US dollars to finance farmer insurance program. The amount is expected to cover insurance for 2.4 million hectares of rice fields or equivalent only to twenty percent of the total twelve million hectares of rice fields in the country. One of the criteria set by the government is that only those farmers owning less than two hectares of land will be included in the program that subsidizes 80 percent of the premium while the 20 percent shall be paid by the farmers. The payment for the premium is schedule only in the planting period that falls in April to September and October to March. In case of harvest failures due to drought, flood, and pests the farmers can claimed a maximum of 463 US dollars per hectare. Only farmers suffering failures in 75 percent of the total hectares can claim the compensation. The project was piloted South Sumatra and East Java covering 1,500 hectares. The insurance company of Malaysia is likely to be state owned that is follow up to the newly endorsed Protection and Empowerment of Farmers Law. The law obliges the government to provide agricultural insurance to cover losses caused by harvest failures due to natural disasters, pests and weeds, infectious crop disease outbreaks and climate change.

India[24]

India's agriculture insurance scheme was examined soon after the Independence in 1947. Following an assurance given in this regard by the then Ministry of Food and Agriculture (MOFA) in the Central Legislature to introduce crop and cattle insurance, a special study was

[23] This discussion was obtained from the Jakarta Post dated January 8, 2013, http://www.asianewsnet.net/ann_news.php?a=http://www.asianewsnet.net/Indonesia-to-spend-US$33m-on-farmer-insurance-prog&id=49762

[24] An elaborate discussion of India's agriculture insurance can be read from the working paper entitled, Agricultural Insurance in India Problems and Prospects, NCAP Working paper 8

commissioned during 1947-48 to consider whether insurance should follow an "Individual approach or a Homogenous area approach". The study favored the homogenous area approach even as various agro-climatically homogenous areas are treated as a single unit and the individual farmers in such cases pay the same rate of premium and receive the same benefits, irrespective of their individual fortunes. In 1965, the Government introduced a Crop Insurance Bill and circulated a model scheme of crop insurance on a compulsory basis to State governments for their views. The bill provided for the Central government to frame a reinsurance scheme to cover indemnity obligations of the States. However, none of the States favored the scheme because of the financial obligations involved in it. On receiving the reactions of the State governments, the subject was referred to an Expert Committee headed by the then Chairman, Agricultural Price Commission, in July, 1970 for full examination of the economic, administrative, financial and actuarial implications of the subject.

A study in Tamil Nadu, India looked into the crop insurance implementation under the yield-based insurance or the National Agricultural Insurance Scheme (NAIS) as well as under the weather-based insurance called VarshaBima (Mani et al, 2012). The VarshaBima or the rainfall insurance scheme covers losses due to insufficient rainfall. Lack of awareness, high premium rates, and the significant difference between the actual crop yield/rainfall and reference measurements proved to be common problems to both the yield-based and weather-based schemes. Other problems encountered by the NAIS include complicated requirements and late claim settlements, On the other hand, the farmers identified that the benefit's unavailability was the fundamental problem of the weather-based insurance scheme. The farmers also expressed the need for a multi-peril insurance that would cover excess rainfall.

In 2002, the Agriculture Insurance Company of India Limited (AIC) considered a specialist public sector crop insurance company was formed by the government. The NAIS scheme represents a public sector undertaking that has both social and economic objectives, namely to provide India's predominantly small and marginal farmers with access to seasonal production credit at affordable premium rates. Government financial support to the NAIS is shared on a 50:50 basis by the federal government and the state and union territory governments. Public-sector livestock insurance has attracted 50 percent premium subsidies since 2007 (FAO, 2011). AIC is heavily subsidized by federal and state governments. The banks are responsible for marketing and administering the NAIS scheme on behalf of AIC, and their charges amount to five percent of premium.

In September 2010, the Government of India approved the modified National Agricultural Insurance Scheme (mNAIS), moving from a social crop insurance program with ad-hoc funding from the Government of India to a market-based crop insurance program with actuarially sound premium rates and product design. Given the technical and operational challenges associated with moving from the NAIS to the mNAIS, implementation began with a three-season pilot, starting with 34 districts across 12 states for the Rabi 2010-11 crop, and scheduled to increase to 50 districts (around a tenth of India). In Rabi 2010-11 approximately 340,000 farmers purchased policies under this scheme, with a premium volume of

approximately US$10 million, and over time it could be expanded to India's 110 million farmer households (Mahul, O., Verma, N., and Clarke, D., 2012).

Argentina[25]

Crop hail insurance was first introduced in 1874. This product was marketed mainly by mutual companies and cooperatives until 1994 when several private insurance companies started to offer crop insurance. About 60% of the tillage land is insured in Argentina. Farmers purchase insurance mostly for field crops. The major crops insured are soy beans, wheat, corn and sunflower. About 67% of the premiums are being collected on oilseed insurance contracts, insurance of grain crops add 31% of the premiums.

The most demanded and marketed product is crop hail, damage-based insurance. The share of hail and named perils coverage constitutes about 96.82% of the total contracts sold in 2011. Due to the high competition within the crop insurance market during the last few years, the number of products, the risks covered, and the levels of coverage have been expanded. Therefore, companies commonly offer products like multi-peril crop insurance (MPCI), MPCI portfolio coverage, and insurance coverage for hail plus additional risks like wind, freeze, excess of moisture, and other named risks. The share of MPCI contracts is minor and constitutes 3.13% from the total number of contracts. Nine insurers currently offer MPCI coverage. Large farms purchase some of these products; however, traditional crop hail insurance still accounts for about 95% of the total market premium volume.

In spite of the importance of beef production and exports to the Argentinean economy, livestock insurance products are very under-developed in Argentina and, despite many attempts to introduce this class of business; the demand is still limited to high value animals (mainly bloodstock). In 2011 only 3 insurance companies offered livestock insurance. The share of livestock insurance contracts constituted only 0.02% from the total number of contracts in 2011.

Federal government support to agricultural insurance in Argentina is limited to assisting provinces and insurance companies in the development of agricultural insurance programs, basically by providing technical support and information. However, in the recent years, several provinces have developed their own subsidized crop insurance programs in order to provide protection to their local farmers (for example Mendoza, Río Negro, and Chaco Provinces). There is no special agricultural insurance legislation.

Since 2003 the agricultural insurance market reported steady growth both in area insured and premiums collected. While in 2003 insurance companies insured crops at the area of 10.3 million hectares, the area insured in 2010 amounted to 1,144 million hectares. The sum of premium collected in 2003 was 53 million Euro. In 2010 the premium sum constituted about

[25] An extensive review of Argentina's insurance program can be found; (http://www.agroinsurance.com/en/pratice/?pid=14311#sthash.nxOdzqIh.dpuf.) also from the report of Mahul, Olivier and Stutley, Charles. 2010. Government Support to Agricultural Insurance Challenges and Opportunities for Developing Countries, World Bank. Accessed from: https://openknowledge.worldbank.org/handle/10986/2432

200 million Euro. The insurers reported that the increase in premium sum could be explained mostly by the increase of grain prices and by the growth of area insured.

In 2008 there were about 30 insurance companies offering agricultural insurance products. Twenty-three were private insurance companies, six were cooperatives, and one was a public insurance company. The two main insurers, La Segunda and Sancor, both cooperatives, have together about 50% of the market share in terms of written premiums, and the five biggest players underwrite 75% of the agricultural insurance premiums in this market.

The most popular product is traditional crop hail insurance (crop hail policy with a 6% damage franchise). Due to the strong competition in the market over the last decade, the range of products, types of coverage, and covered risk has been diversified and expanded. Therefore, products like MPCI, MPCI global portfolio covers, and traditional crop hail insurance are available for different deductible levels, and hail plus additional risk covers like wind, freeze, excess rain at harvest and, in some cases, even drought are commonly offered in the Argentinean market.

Brazil

In Brazil, production cost insurance had been experimented in the 1970's, wherein insurance coverage was based on out-of-pocket production expenses and indemnity payment depends on the shortfall. This insurance program covered the states of São Paulo and Minas Gerais, where participation was compulsory for cotton farmers in São Paulo but voluntary for other crops and in Minas Gerais. The program in São Paulo had a loss ratio of 1.33 (for all crops) for the period 1971-1980 while that in Minas Gerais had a loss ratio of 3.05 (for all crops) for the period 1973-1979.

A credit insurance program (i.e., PROAGRO) also existed in Brazil, wherein the insurance was a requirement for access to official credit and the coverage was based on the amount of farmer's credit. The overall loss ratio for this program from 1975 to 1981 had been 3.87 (Wright and Hewitt, 1993).

A more innovative product piloted in 2010 in Parana, Brazil is the agricultural income insurance. This product offers productivity coverage with a price guarantee. The income insurance program pilot program served ten soy producers in the southern part of the region with insured sum of approximately five million reals. In 2011, a private insurer link this to a bank that provides rural credit that generates 15 million reals in premiums for an insured sum of approximately 213 million reals. It was reported that the average claims rate was considered very good and did not surpass 35% according to the Swiss Re Group, a leading wholesale provider of reinsurance, insurance and other insurance-based forms of risk transfers.

The same group mentioned that, agricultural income insurance has been unable to establish more of a foothold due to producers' unfamiliarity with the product and with the price-protection mechanism, the limited reach of the sales network, and the lack of subsidies

available for the sector overall, among other factors. Despite the positive results of this product in just three years, risk remains concentrated in the southern portion of the country, which is more exposed to climate events than are other regions. Another important point is the relatively high cost of the product, which is equivalent to about 9% to cover 70% of the producer's expected income. Therefore, without a subsidy, this insurance is practically unaffordable for the producer.

Table 4 below provides the salient features of selected countries' agriculture insurance program.

Table 4 Salient Features of the Selected Countries' Agricultural Insurance Program

Salient Features	Selected Countries with Agriculture Insurance											
	Australia	**Sweden**	**New Zealand**	**Spain**	**Germany**	**USA**	**Japan**	**Malaysia**	**Indonesia**	**India**	**Argentina**	**Brazil**
History of Agri Insurance	Started in 1918 Expansion started in 1960s	1890 for livestock 1928 for crop insurance	For livestock insurance -1970s; crop insurance started in 1980s;	1980- Combined Agricultural Insurance, 2008 Agroseguro	1773- crop hail insurance, 1830 -cattle	1938 Public Sector Private mutual company, more than a century	1929- livestock insurance 1937 - forest insurnace law 1947 Agri cooperative association solidarity of farmers, networks of coops	never implemented a national agri or livestock insurance scheme 1980- limited private commercial insurance for export crops; rubber, oil palm, fruit, cocoa	no traditional crop and livestock insurance 2009- piloted MPCI crop insurance and livestock	1972- pilot insurance for crop 1985 - comprehensive crop insurance 2000- area based approach	1874- crop hail insurance 1994- private insurance companies	1954- Federal gov PROAGRO
Market Structure	3 private sector insurers 9 crop insurance only	3 private mutual insurance companies	4 private insurers, 1 private company livestock, Lloyd's of London direct insurer	Agroseguro pool - 28 private insurance companies	14 insurance companies both public and private	17 private insurance companies Designated by the US DA		35 companies including 30 direct insurers, of which 15 are general (non-life) insurers and five local reinsurers	local insurer- Daspindo	Agriculture Insurance of India Limited	30 insurance companies 23- private , 6- coops, 1 - public insurance	Commercial Agri Insurers -8 Public Sector - Central Bank of Brazil
Agri Insurance Products Available												
Crop Insurance												
MPCI	No	No	No	Yes	Yes	Yes	Yes	No	Yes	No	Yes	Yes
Named Peril	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No	Yes	Yes	Yes
Crop Rvenue	No	Yes	No	No	No	Yes	No	No	No	No	No	No
Index based	No	No	Yes	Yes	No	Yes	No	No	Yes (R&D phase)	Yes	Yes	Yes
Greenhouse	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No	No	Yes	No
Forestry	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes
Aquaculture	Yes	No	Yes	Yes	Yes	Yes	Yes	No	No	Yes	Yes	No
Livestock Insurance												
All risk	No	No	No	No	Yes	Yes	Yes	No	No	No	No	No
Accident and Mortality	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes
Index based	No	No	No	No	No	Yes	No	No	No	No	Yes	Yes
Epidemic Disease	No	Yes	Yes	Yes	Yes		Yes	No	No	No	No	No
Delivery Channels	Brokers, stock and station agents and banks,	Producer and coop associations	Insurance brokers, producer associations	Agroseguro; producer associations	Cooperatives and farmer's association	Not elaborate but "insurance agents"- considered important delivery channels	300 cooperatives		rural and commercial banks	National Agricultural Insurance Scheme	agents and brokers	local brokers, banks, producer/coops
Voluntary vs. Compulsory												
Voluntary	Yes- crops	Yes voluntary and with high participation	Yes	Yes	Yes	Yes -crops	livestock, fruit	medium to large estates	MOA pilot programs are tied to credit	weather index based, livestock	crop is voluntary	private sector insurance
	Yes- livestock	between 60-80%				Yes livestock						
Compulsory			compulsory for kiwifruit industry			producers who avail crop disaster assistance	Main agri products, wheat, barley, rice			farmers who avail of credit	farmers who access loan/credit	for credit recipients
Agri Reinsurance	Private Insurance	Private insurance	Private sector reinsurance	Concorsio de Compensación de Seguros (CCS)- public sector	No public support for re-insurance	Yes, FCIC USDA	100% agri insurance liability reinsured by Japanese government	NA		reinsured by government	local reinsurers but restricted	2007- foreign reinsurers allowed
Public Support	No premium subsidy	No government support	None	between 70-90%, shared by NG and provincial gov	Premiums not subsidized, No public subsidies for crop insurance	Yes, premium subsidies, Yes, administration and operation expenses	50% premium subsidy	NA	Pilot programs, gov has 100% premium	50% federal , 50% by the state and union territory states	private commercial for more than 100 years 2008- public sector support	premium subsidy for livestock, forestry, aquaculture- 30% crops- 40-60%
Agri Insurance Penetration	50% for crop insurance 5% for livestock	herd and poultry - 100% Crop- 52% livestock - 70%	crop - 5% excluding those industry associations	HVCC- 85%-100%; livestock 100% , 25% crops	crop - about 60%; livestock 50%	between 72% to 90% - one of the highest in the world	53 % for crop only	NA	NA	15 % crop 3% livestock	about 50%	4.8 % (crops, livestock, forestry)
Financial Performance								NA	NA			
(2003-2007) total premium basis										73% loss ratio 2007-2008		
Crop Insurance	betweem 29% to 71 %	58%	50% (ave loss ratio)	83%	82% (whole)	70%	94% ave loss ratio (1986-1995)				about 62% ave loss ratio	109% average annual loss ratio
Livestock Insurance		48%		88%		67%						
Private Crop Hail Insurance						51%						
Cost of Agri Insurance Provision	around 22.5%	between 29-31%	22% of OGP			26.2% of the Original Gross Premium		NA	NA	heavily subsidized by government AIC charges 2% operation, over-all cost structure of 7% of premium	87% combined ratio for crop insurance	NA

Sources: FAO, 2011, Agricultural insurance in Asia and the Pacific region. World Bank report, 2010

4 Role of government in providing agricultural insurance

As discussed in the previous sections, many countries are providing subsidies to agriculture specifically crop and livestock insurance. A summary of the salient features of the different agriculture insurance in both developed and developing economies gave us a deeper appreciation of the role of insurance in the lives of many farmers across the globe. The subsidized agriculture insurance in the US and private led agriculture insurance without subsidies by the Australian, New Zealand and Swedish governments provide us clearer understanding of the different modalities of agriculture insurance among the countries reviewed in this paper. It gave us a different perspective that insurance in agriculture can work even without government subsidies. Other countries included in this paper are relatively new in the agriculture insurance namely Malaysia and Indonesia where government role is crucial in establishing a national agriculture insurance program. Government's role in the development of agriculture insurance is crucial as it entails public funds to be used in subsidizing premiums and development of legal and institutional infrastructures for a functioning agriculture insurance system.

In some Latin American and Asian countries in the 1970's and 1980's, these crop insurance programs were generally multi-peril crop insurance catered to small-scale farmers and the premia were heavily subsidized by the government (usually more than 50% of the original gross premium). Aside from premium subsidies, many governments also provided administrative and operational subsidies as well as public sector reinsurance subsidies (Mamhot and Bangsal, 2012). Government support in the form of premium subsidies is deemed not sufficient to encourage farmers to avail themselves of insurance. Thus, many governments required farmers to purchase insurance when they avail of the government-sponsored credit programs.

However, many of the government-subsidized insurance programs in developing countries have not performed well because of high transaction cost associated with asymmetric information problems (i.e., adverse selection and moral hazard) as well as other operational and administrative costs (e.g., marketing of insurance products to geographically dispersed clients, loss adjustment for yield-based insurance programs, and risk classification and monitoring systems, among others). Climatic risks affecting the agriculture sector on a larger scale could adversely affect the financial capacity of insurers, especially if a large number of farmers will claim indemnities simultaneously. This is one of the main reasons for any agricultural insurance not being able to cover the claims for indemnity with premia (Mamhot and Bangsal, 2012).

The fact that there are widespread presence of subsidies raises two important points:

(1) Voluntary payment of full-cost insurance will likely result in much less than full insurance coverage, and

(2) The ethical or moral imperative to protect poor households provides a rationale for state involvement in some aspects of insurance.

While many governments in developing countries also are concerned about natural disaster management programs to protect against and to mitigate the consequences of major natural disasters including typhoons, floods and droughts. The traditional approach to a disaster event is for the national government to provide direct disaster assistance up to the point they can afford and to then appeal to the international community for emergency relief. While natural disaster relief and food aid programs are well intentioned, they are often hampered by implementation problems which result in unintended consequences which Hazell and Hess (2010) and Skees (2009) summarized as:

- The costs of immediate post-disaster emergency relief and medium term recovery and reconstruction costs after a natural disaster are usually very high and in many developing countries the national budget is inadequate to bear these costs. Funding of emergency relief diverts resources from development;

- Following a major widespread natural disaster when communications and transport networks are usually disrupted, it is often very difficult to target relief assistance, like immediate food aid, replacement seeds, fertilizers and livestock to the intended beneficiaries (most in need) and major leakage of food aid occurs;

- There are often major delays in responding to natural disasters and often the food aid and other forms of assistance arrive too late to be effective and to prevent asset depletion by resource poor farmers and rural households.

- Disaster relief, especially in the form of food aid can distort incentives for farmers to replant their crops by depressing prices for locally produced food crops

- The provision of disaster assistance may have unintended consequences by increasing farmers dependency on government or donor assistance and this may also encourage farmers to continue poor farm management or cropping practices.

Despite the different issues surrounding the agriculture insurance in both developing and developed economies, governments continue to provide subsidies to this program. A summary of the reasons in this subsidy program are summarized by Stutley (2012) as the following;

-Market failure - poorly developed insurance markets and non-availability of private-sector agricultural crop and livestock insurance;

-Reluctance of commercial insurers to develop agricultural insurance programs because of the prohibitively high start-up costs;

- Financial capacity constraints faced by private commercial insurers, particularly for systemic risk (drought, flood, epidemic diseases, etc.);

- High costs of insurance administration for small farmers; and inability of small and marginal farmers to afford agricultural crop and livestock insurance premiums.

Stutley (2012), also outlines on how governments and other public institutions play a role in ensuring insurance markets develop in a way that provides high quality products to poor households. Getting regulations right for agricultural micro- insurance is important, as are the following:

Support researches into the right products are crucial in any agricultural insurance programs. There is still much to be learned about the right way to design insurance products for rural households. Optimal product design will vary depending on the context, and institutions that can support design, adaptation, and development of indexed insurance products is important. These investments are too large, and with too many externalities, for one private insurance company to make them.

There should be investment in infrastructure to provide timely and credible indices. In the case of weather indices this requires investment in weather stations that can provide timely and accurate information. In the case of area-yield index insurance this requires substantial investments in the personnel and procedures to conduct independent and accurate crop cutting experiments at harvest time.

There should also be investments in training to build capacity in the insurance industry and to develop an understanding of products among rural households. Indexed insurance products are different from insurance products that are usually on offer in domestic insurance markets in sub-Saharan Africa. Additionally, selling insurance products to a rural clientele requires different retail structure than most domestic insurance companies which mainly cater to urban markets. It is thus important to build capacity among domestic insurance companies by conducting training on the design of index products, risk-financing for agricultural insurance and rural retailing strategies. Increasingly there are lessons to learn from other countries in terms of what has and has not worked.

Training for rural clientele is also crucial in every agricultural insurance product promotion. Insurance products are complicated and the amount and type of training needed by an individual to know how much insurance to buy, and whether they should prioritize investing in savings above insurance, is very different from the type of training an insurance company can be expected to provide to sell a product.

Incentives to serve rural markets must be clear enough to different stakeholders in the insurance market. Governments can provide incentives to private companies to develop products that serve rural households by mandating a certain percentage of sales come from sales to rural households, or by mandating that insurance coverage is purchased in certain situations.

Too often, agricultural insurance is perceived by policy makers as a means by which to provide a safety net for farmers or even to increase their agricultural revenue. Agricultural insurance cannot solve problems of low farm income and poverty by itself. Although it can sometimes help channel additional social benefits to targeted farmers, it should not be considered an instrument that can provide poor farmers with higher revenues (Mahul and Stutley, 2010).

When well-targeted and reliably distributed, social protection can help insure very poor households for whom market-based solutions are likely to be out of reach (Hoddinott, 2009). It can, however, be costly and difficult to target social protection schemes to the poorest households and to ensure they deliver timely support when bad events strike. Complementing social protection with market-based forms of insurance can help.

5 Learning points and concluding remarks

This paper reviews different agriculture insurance program of selected twelve countries based on available information primarily from the reports of the World Bank in 2010 and FAO in 2011. Updates were also sought from different sources such as government websites of the countries included in this review and various research reports. The countries Germany, Sweden and Argentina started implementing agriculture insurance in 1700s and 1800s while the remaining countries only in 1900s. The governments of Spain, United States, Japan, Indonesia, India, Argentina, and Brazil provide subsidy for agriculture insurance. On the other hand, the governments of Australia, New Zealand, Sweden, and Germany provide subsidy for agriculture insurance although it varies in terms of coverage and priority crops. In the case of Malaysia, there is no mention of government subsidy provided to both large scale plantation and small land holder producers of rubber, oil palm and cocoa.

Among the twelve countries reviewed, Indonesia provides the highest subsidy given to agriculture insurance. Although in its pilot stage, Indonesia provides 100 percent premium subsidy for crop and livestock insurance. In the case of the United States, the premium subsidy is between 72-90 percent, coupled with subsidies to both administration and operation expenses for agriculture insurance which can also be considered one of the highest in the world. Spain also provides subsidy between 70-90 percent for its agriculture insurance shared by national and provincial government. India's scheme is also a sharing of 50 percent from both the federal and union states. Japan's subsidy is 50 percent with 100 percent liability reinsured by the Japanese government. Brazil's subsidy ranges between 30 to 60 percent depending on the crop being insured while Argentina only provides support in 2008.

Delving deeper into the insurance market in each of the countries, one can notice the presence of private insurers together with government run agriculture insurance company in the case of India while cooperatives and associations in the case of Japan. The number of private insurance differ across countries with about 28 private insurance companies in Spain, about 23 private insurance companies in Argentina, 17 private insurance companies in the United States designated by the US Department of Agriculture and 14 private insurance companies in Germany. However, less than ten private insurance companies are operating in Australia, Sweden, and New Zealand.

Among the countries reviewed in this paper, Brazil, Argentina, India, and Indonesia mentioned about using crop insurance as credit collateral. In Argentina, crop insurance is compulsory for farmers who access seasonal crop loans from banks. In Brazil, rural banks may require

borrowers to take crop insurance policy to protect their seasonal crop production loans. In India, crop insurance is compulsory for all farmers who access seasonal crop production credit from the lending institutions. Crop insurance although important, are only part of a set of tools to manage risk in agriculture. Farmer's access to credit, inputs for production and efficient marketing channels to ensure that they can start in the new production cycle after a calamity must complement with the crop insurance. Crop insurance can be a part of the agriculture program geared towards climate change mitigation and adaptation strategy. With crop insurance and other support to the farmers, these may motivate them to invest in more risky farming and yet high yielding activities such as producing more high value crops.

It can also be deduced that there are different modalities of providing subsidy for the agriculture insurance by the governments of the countries mentioned in this paper. The beneficiaries of the insurance subsidy are all characterized by small and marginalized farmers in Spain, Japan, India, Argentina, and Brazil while there was no specific mentioned in the case of the United States. Both India and Japan specifies that two hectares below are those qualified for subsidy from their governments. In Argentina, a farmer who losses 50 percent of their production from calamities are qualified for compensation under the Agricultural and Livestock Emergency Law.

In the Philippines, the crop insurance program is implemented by the Philippine Crop Insurance Corporation. The PCIC has generally dual objectives in the implementation of the crop insurance – that of enhancing access to credit as well as managing risks from natural calamities, pests and diseases. The Philippine government through PCIC provides about 50 percent of the premium subsidy for rice and corn farmers. As compared to the countries in this review, the Philippines' provision of the premium subsidy is within the range of those subsidies given by other governments discussed earlier. There is also a sharing scheme between the national government and local governments in the giving premium subsidies as practiced by India and Spain. This sharing scheme is analogous to some of the provincial governments in the Philippines that provides a premium subsidy to the farmers in partnership with the PCIC. An obvious difference in the Philippine agriculture insurance program to some of the countries reviewed, is the absence of private insurance companies to complement with the government run insurance company. The World Bank observed that public-private partnerships in agriculture insurance led to more accountability and improved financial performance in agricultural insurance programs. It added that the role of the government is to address market and regulatory imperfections in order to encourage private insurance sector to participate in developing agriculture insurance products.

Another aspect of the insurance programs in other countries is the explicit provision of administrative and operation expenses in the United States and India while not provided by the Philippine government to PCIC in recent years. Like most countries reviewed in this paper, crop and livestock insurance are commonly subsidized and insured in all countries. However some countries have added priorities like Spain insures HVCC, Brazil insures aquaculture and timber while Australia insures the kiwi fruit and Japan insures wheat and barley. Perhaps one relevant policy issue is the allowed number of hectares to be given free premium subsidy. In the Philippine case, a maximum of three hectares rice and corn farm can avail of the free premium

subsidy while other countries reviewed in this paper only allows for a maximum of two hectares. Perhaps, another point of consideration is that only those farmers' with three hectares below can avail of the free premium subsidy. Do farmers who own three hectares of land in the Philippines are considered subsistence and marginalized?

While the Philippine government has initiated a registry system for basic sectors in agriculture (RSBSA) in 2012, it is beset with both inclusion and exclusion issues and thus needs further validation. The registry has now become the basis for PCIC's giving of free premium insurance subsidy to those who are in the registry. In the past couple of years, the PCIC was given an average of about a billion pesos to give free premium subsidy but not enough to cover around nine million farmers listed in the registry given the maximum three hectares allowed for free premium subsidy. Basing from PCIC data, the average number of hectares for farmers in the Philippines is 1.1 hectares for rice and corn. PCIC is also constrained in terms of manpower as there are only 14 regular positions in their regional offices with job orders hired to help in the operations. Will the national government continue to provide free premium subsidy for agriculture insurance and increase capitalization of PCIC?

Farmers especially in the developing countries are considered to be of the small subsistence type, producing food crops for on-farm family consumption. Thus, agriculture insurance is a luxury few of them can afford. And perhaps, this justifies governments' intervention to make agriculture insurance more affordable through premium subsidies. While it is recognized that there is a pressing need to enable the poor households to better deal with shocks, it is evident that providing subsidies are costly for most governments in developing economies. Improving the welfare especially for the poor in the short run and increasing their opportunities for income growth in the long run may happen when subsidies are well-targeted to the deserving poor. Targeting the eligible beneficiaries is crucial in the success of a highly subsidized insurance program especially in resource constraint developing countries.

References

Du, Xiaodong, Feng, Hongli, and Hennessy, David A. 2014. Rationality of Choices in Subsidized Crop Insurance Markets *Working Paper 14-WP 545*. Center for Agricultural and Rural Development, Iowa State University. Accessed from; http://www.card.iastate.edu/publications/dbs/pdffiles/14wp545.pdf

FAO.2011. Agricultural insurance in Asia and the Pacific region. Food and Agriculture Organization, Bangkok, Thailand. Accessed from: www.fao.org/docrep/015/i2051e/i2051e00.pdf

Hatt, M., Heyhoe, E. & Whittle, L. 2012. Options for insuring Australian agriculture, ABARES report to client prepared for the Climate Change Division, Department of Agriculture, Fisheries and Forestry, Canberra, September. CC BY 3.0.
Accessed from: http://www.daff.gov.au/SiteCollectionDocuments/ag-food/drought/ec/nrac/work-prog/abares-report/abares-report-insurance-options.pdf

Hazell P.B.R., and U Hess .2010. Drought insurance for agricultural development and food security in dry-land areas. Food Sec.

Hill, R.V. and Torero, M. 2009. Innovations in Insuring the Poor. The International Food Policy Research Institute (IFPRI). Accessed from: http://www.ifpri.org/sites/default/files/publications/focus17.pdf

Hill, Ruth Vargas. 2010. Agricultural insurance in Sub-Saharan Africa: can it work?
Fourth African Agricultural Markets Program (AAMP) policy symposium, *Agricultural Risks Management in Africa: Taking Stock of What Has and Hasn't Worked,* organized by the Alliance for Commodity Trade in Eastern and Southern Africa (ACTESA) and by the Common Market for Eastern and Southern Africa (COMESA).Accessed from : http://fsg.afre.msu.edu/aamp/sept_2010/aamp_lilongwe-vargas_hill-agricultural_insurance.pdf

Mahul, Olivier and Stutley, Charles. 2010. Government Support to Agricultural Insurance Challenges and Opportunities for Developing Countries, World Bank. Accessed from: https://openknowledge.worldbank.org/handle/10986/2432

Mahul, Oivier., Verma, Niraj., and Clarke, Daniel J. 2012. Improving Farmers' Access to Agricultural Insurance in India, World Bank. Accessed from: http://elibrary.worldbank.org/doi/pdf/10.1596/1813-9450-5987

Mamhot, P.C. and Director Novel V. Bangsal, N.V. 2010. Review of the Philippine Crop Insurance: Key Challenges and Prospects.
Accessed from; http://serp-p.pids.gov.ph/CPBRD/PB2012-06.pdf

Mani, K., Chandrasekarana ,M. and Selvanayakib S. 2012. Adaptability of Crop Insurance Schemes in Tamil Nadu. Agricultural Economics Research Review
Vol. 25(No.2) July-December 2012 pp 279-290. Accessed from:
http://ageconsearch.umn.edu/bitstream/137353/2/9-K-Mani.pdf

National Rural Advisory Council.2012. Feasibility of agricultural insurance products in Australia for weather-related production risks. Accessed from http://www.agriculture.gov.au/ag-farm-food/drought/nrac/work-program/agricultural-insurance-feasibility.

Raju, S.S. Raju and Chand, R. 2008. Agricultural Insurance in India Problems and Prospects National Centre for Agricultural Economics and Policy Research (Indian Council of Agricultural Research, NCAP Working paper 8. Accessed from; www.obinsa.es/.../Agricultural+Insurance+in+India+Problems+and+Pros

Skees, J., Hazell, P., and Miranda, M. 1999. New Approaches to Crop Yield Insurance in Developing Countries. Accessed from: http://www.ifpri.org/sites/default/files/publications/eptdp55.pdf

Skees, J.R., (2009). Ex Ante Financing of Disaster Risk Management and Adaptation: A Public Policy Perspective. Oiura, Peru, November 18, 2009.

Smith, Vincent H. and Glauber, Joseph W. 2012. Agricultural Insurance in Developed Countries: Where Have We Been and Where Are We Going? Applied Economic Perspectives and Policy (2012) volume 0, number 0, pp. 1–28. doi:10.1093/aepp/pps029. Downloaded from http://aepp.oxfordjournals.org/ by guest on May 4, 2014

Smith, Vincent. 2012Premium Payments Why Crop Insurance Costs Too Much? Accessed from: http://www.aei.org/wp-content/uploads/2011/11/-premium-payments-why-crop-insurance-costs-too-much_152221377467.pdf

Stutley, Charles. 2012. Promoting Food Security in a Volatile Climate: The Role of Agricultural Insurance. Accessed from : https://www.kfw-entwicklungsbank.de/migration/Entwicklungsbank-Startseite/Development-Finance/Sectors/Financial-System-Development/Events/Symposium-January-2012/Stutley.pdf

S.V.R.K. Prabhakar, A. Abu-Bakar, C. Claudio, H.V. Hung. 2013. Promoting Risk Financing in the Asia Pacific Region: Lessons from Agriculture Insurance in Malaysia, Philippines and Vietnam. Hayama, Japan: IGE

Swiss Re. Income insurance in Brazil and the government's role. Accessed from : http://www.swissre.com/latin_america/income_insurance_brazil_and_government_role.html

Hill, R.V. and Torero, M. 2009. Innovations in Insuring the Poor. The International Food Policy Research Institute (IFPRI). Accessed from: http://www.ifpri.org/sites/default/files/publications/focus17.pdf

Wenner, Mark. 2005. Agricultural Insurance Revisited: New Developments and Perspectives in Latin America and the Caribbean. Rural Development Unit Sustainable Development Department Inter-American Development Bank 1300 New York Avenue, N.W. Accessed from : http://idbdocs.iadb.org/wsdocs/getdocument.aspx?docnum=734611

Wenner, Mark and Arias, Diego. (2003). Agricultural Insurance in Latin America: Where Are We? Inter-American Development Bank. Accessed from: www.iadb.org/events/file/do452.doc

Wright, B.D. and Hewitt, J. A. 1993. Crop Insurance for Developing Counties. In P. Berck and D. Bigman, eds. Food Security and Food Inventories in Developing Countries. Wallingford: CAB International.