



# NRAC

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National Rural Advisory Council

## Feasibility of agricultural insurance products in Australia for weather-related production risks

September 2012



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# Abbreviations

ABARES	Australian Bureau of Agricultural and Resource Economics and Sciences
bu	bushel
CBH	Co-operative Bulk Handling Ltd
CSIRO	Commonwealth Scientific and Industrial Research Organisation
DAFF	Australian Government Department of Agriculture, Fisheries and Forestry
ha	hectare
MPCI	multi peril crop insurance
NRAC	National Rural Advisory Council
OECD	Organisation for Co-operation and Development
PPP	public-private partnerships
t	tonne
USDA RMA	United States Department of Agriculture Risk Management Agency



## Scope of the assessment

The National Rural Advisory Council (NRAC) will conduct an assessment of agricultural insurance products that could cover weather driven agricultural production downturn. The assessment will include potential insurance products such as multi-peril crop insurance, weather derivatives, yield indexes and mutual cost of production programs. The assessment should determine the feasibility and practicality of implementing these products in Australia.

In conducting the assessment, NRAC will:

- Review all relevant literature to make a determination on the suitability and practical requirements of these products to assist weather driven risk management practices, including an analysis of any past and existing trials of relevant crop insurance products.
- Detail the challenges, for both industry and government, associated with implementing these products. For example:
  - » The ability of the product to cover the whole sector (for example, the variety of crops that could be covered under multi-peril crop insurance).
  - » The ability of the product to cater for different production systems and geographical areas (for example, availability and/or collection of data required to underpin these products, including analysis of the costs and logistical difficulties involved).
  - » The administrative and financial requirements that would be required of the participating farmers.
  - » How these products would perform in a geographically widespread or a multi-year drought event.
- Provide advice on the feasibility and the likelihood of these products being commercially viable or the requirement for initial and ongoing government assistance if not commercially viable.
- Canvas the views of key stakeholders.

## Timeframe and reporting

- Assessment to be conducted from July 2012 to September 2012.
- Assessment completed and written report submitted to the Minister for Agriculture, Fisheries and Forestry by 28 September 2012.

## Supporting structures

Supporting research, data and secretariat functions will be provided by the Department of Agriculture, Fisheries and Forestry.

# National Rural Advisory Council

NRAC was established under the Australian Government's Rural Adjustment Act 1992 (Cwlth) to provide independent expert advice and information as requested to the Australian Government Minister for Agriculture, Fisheries and Forestry, including on:

- rural adjustment
- regional issues
- training issues
- Exceptional Circumstances declarations
- matters the minister requests advice or information about.

NRAC comprises eight members—a chairperson, a state representative, a Commonwealth representative, a National Farmers' Federation representative, and four other members appointed to provide expertise in areas relevant to the operations of NRAC, such as economics, financial administration, banking, sustainable agriculture, regional adjustment, regional development, farm management or training.

# Glossary

The terms listed in this glossary are used throughout this report.

**Administration costs:** Refers to all administration costs required to operate an insurance scheme, including the insurer's operating expenses, loss assessment costs and information gathering and monitoring costs.

**Adverse selection:** Refers to a situation where insurers are unable to distinguish between low risk and high risk clients. People who are more likely to suffer loss will be more willing to insure at a given rate. As a result, as insurers raise premiums to cover costs and losses, an increasingly risky pool of participants will purchase insurance.

**Asymmetric information:** Refers to situations where farmers know more about their yield risks than do insurers.

**Basis risk:** Refers to the situation where the nature of an insurance policy is imperfectly related to actual risk. If the basis risk is high, the insurance policy may only provide partial protection from the risk that is being insured.

**Granularity:** Refers to characterising the scale or level of detail in a set of data. In the context of this report, farm-level production data has a higher granularity than does regional production data.

**Index-based insurance:** Refers to insurance where payouts are not determined by individual farm yields, but rather on an index derived from other information such as weather or shire-level yields. This overcomes the problem of information asymmetries and therefore lowers administrative costs.

**Loss assessment:** Refers to the determination of the extent of damage resulting from occurrence of an insured peril and the settlement of the claim.

**Loss cost:** Refers to payouts divided by sum insured.

**Loss ratio:** Refers to total insurance payouts as a share of total premiums. This is a useful means for understanding the price of premiums over and above the risk cost.

**Market failure:** Refers to a situation where the free market does not allocate goods or services in the most efficient way. The existence of a market failure may be used to justify government intervention in a market.

**Market penetration rate:** Refers to a measure of the amount of sales or adoption of a product or service compared to the total theoretical market for that product or service.

**Market risk:** Refers to uncertainty associated with commodity prices, exchange rate fluctuations and access to international markets. Market risk is more systemic than production risk as it affects all farmers in the same way.

**Moral hazard:** Refers to a situation where the insured person's optimal decision may change as a result of taking out insurance. For example, a farmer taking out crop-yield insurance may be more inclined to sow a crop despite poor sowing rain, knowing that the returns in the event of a crop failure will be propped up by an insurance payout.

**Named peril insurance:** Refers to an insurance policy that only provides coverage for the events named in the policy. It provides a payout against a limited number of adverse weather events, such as hail, fire and frost, which are explicitly listed in the policy.



**Payout:** Refers to a sum of money the insured receives from the insurer in the event of an insured loss.

**Premium:** Refers to a monetary sum payable by the insured to the insurer for the period or term of insurance granted by the policy.

**Premium subsidy:** Refers to a certain amount of the total premium of an insurance policy paid by the government or a third party.

**Producer loss ratio:** Refers to total claims as a share of premium incomes excluding subsidies.

**Production risk:** Refers to risk that arises from climatic variability, disease, pests and other factors that influence the level of production.

**Public-private partnerships:** Refers to partnerships where responsibility for agricultural insurance delivery rests with a private commercial or mutual insurers and government commits support usually in the form of premium subsidies and/or reinsurance protection.

**Reinsurance:** Refers to insurance for insurers. Reinsurance is purchased by insurance companies to transfer risks that they do not wish to hold themselves—for example, systemic risk.

**Risk cost:** Refers to the amount of money a person would need to put aside each year (if self-insuring) to cover potential losses in any one year. Risk cost is otherwise known as the actuarially fair premium.

**Systemic risk:** Refers to a risk that affects a large number of individuals simultaneously. This risk provides limited opportunities for insurers to spread risk among a large range of clients.

**Traditional insurance:** Refers to insurance where payouts are triggered based on realised individual farmer yields. Traditional insurance includes named peril insurance, multi peril crop insurance (MPCI) and mutual fund schemes.

# Executive summary

Australian farmers face many challenges, including those posed by variable climatic and market conditions. With climate projections suggesting more frequent extreme weather events, it is reasonable to expect that farmers will increasingly seek to understand, develop and adopt risk management strategies to manage uncertainty, spread risk and maintain business viability. In addition to their current management strategies for production and market risk, Australian farmers may look to agricultural insurance to cover weather-related production risks.

In July 2012, Senator the Hon. Joe Ludwig, Minister for Agriculture, Fisheries and Forestry asked the National Rural Advisory Council (NRAC) to review potential and existing agricultural insurance products that could assist farmers to better manage weather-related agricultural production risk in Australia.

During July and August 2012, NRAC consulted widely with key industry stakeholders – including representatives from within the agriculture, insurance and agribusiness industries and Australian and state and territory governments. NRAC's findings have also been informed by past and present experiences of agricultural insurance in Australia and overseas, and the Australian Bureau of Agricultural and Resource Economics and Sciences' analysis of options for insuring Australian agriculture.

NRAC considered a range of Australian agricultural industries, including crop, horticulture and livestock production, for its assessment. However, given the limited availability of data for all these industries, the report has focused on cropping, for which relatively better information is available.

International experience provides overwhelming evidence that traditional multiple peril crop insurance is not commercially viable without significant and ongoing government support, and that the cost of unsubsidised premiums is beyond what most farmers are willing to pay. NRAC concludes that, given the volatility of Australian agriculture, the projected increase in climatic variability and the insufficient data to underpin agricultural insurance, there is no evidence that this situation would be different in Australia; and, in fact, may be more pronounced.

NRAC is aware of two commercially available index-based insurance products that are currently available in Australia. Although take-up of the Australian products has been limited to date, NRAC considers that this type of insurance may have potential for further development. More broadly, NRAC sees a role for 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 standardised data. This may have the added benefit of assisting the development of new and existing decision support tools and products through access to user-friendly climate data.

Australian agriculture operates in uncertain climatic and market conditions. Australian farmers must constantly manage the risks of volatile markets and variable growing conditions. Current projections are that a changing climate may increase the frequency of extreme weather events, including drought (in some regions), and therefore will increase the need for risk management by farmers.<sup>1</sup> Consequently, it is reasonable to expect that farmers will increasingly seek to understand, develop and adopt risk management strategies, potentially including insurance products for production risk, to manage uncertainty, spread risk and maintain business viability.

In July 2012, Senator the Hon. Joe Ludwig, Minister for Agriculture, Fisheries and Forestry, asked NRAC to review potential and existing agricultural insurance products that could assist farmers to better manage weather-related agricultural production risks in Australia and to report on this by 28 September 2012. The terms of reference are on page vi.

This report assesses the feasibility and practicality of implementing different types of agricultural insurance to cover weather-related production risks faced by Australian farmers. The types of insurance products considered include MPCI, mutual schemes, yield indexes and weather indexes (also known as weather derivatives or certificates). This report examines how products operate in other countries and outlines efforts to date to develop and implement similar products in Australia. It also examines the inherent risks associated with agriculture in Australia and discusses the role agricultural insurance could play in managing these.

This report focuses on 'traditional' insurance, such as multi peril and mutual insurance products, and 'index-based' insurance, such as yield and weather index products:

- Multiple peril crop insurance, such as MPCI, has been the focus of some Australian agricultural industry groups. This type of insurance is not available in Australia but is widely available in a number of other countries, including the United States and Canada.
- A mutual scheme providing multiple peril crop insurance, the Co-operative Bulk Handling (CBH) Mutual's Cost of Production Cover, has been trialled in recent years.
- Yield and weather index products have recently become commercially available in Australia.

In conducting its assessment, NRAC considered a range of Australian agricultural industries, including crop, horticulture and livestock production. However, the availability of data for horticulture and livestock is limited. As a result, this report focused on cropping, for which relatively better information is available, to examine the feasibility and practicality of implementing the above-mentioned insurance products in Australia.

Crop farmers in Australia experience higher levels of weather-related risk compared to other farmers. Crop insurance products are the most developed type of insurance, representing almost 90 per cent of the total value of agricultural insurance policies written globally.<sup>2</sup> Overseas experience indicates that a successful crop insurance scheme would require a high level of production data to operate. There is also some domestic experience with a small number of insurance products for broadacre grain farmers through trials in Western Australia. Western Australia is understood to be the most conducive environment for developing commercially-viable crop insurance products in Australia since broadacre cropping is the largest agricultural industry in this state and the majority of grain is handled through one bulk handler (CBH).

<sup>1</sup> M Hatt, J Walcott & E Heyhoe 2011, *Assessing the feasibility of farm risk management options*, ABARES report to client prepared for the Climate Change Division of the Department of Agriculture, Fisheries and Forestry, Canberra.

<sup>2</sup> R Iturrioz 2009, 'Agricultural Insurance', *Primer Series on Insurance*, issue no. 12, The World Bank, Washington DC.

In addition to reviewing the available literature on agricultural insurance, this assessment was informed by discussions held with stakeholders. During July and August 2012, NRAC invited comment from, and consulted with, representatives from farm businesses and grower groups, national and state farming organisations, agribusinesses, peak industry bodies, agricultural insurance providers, the banking sector, the Australian Government, and state and territory governments. Stakeholders were also given the opportunity to provide NRAC with written views against NRAC's terms of reference.

NRAC has also considered analysis from the Australian Bureau of Agricultural and Resource Economics and Sciences (ABARES) on options for insuring Australian agriculture, which was helpful in examining the feasibility and practicality of multiple peril crop insurance and index-based insurance in Australia.

This report provides an outline of experience in other countries with agricultural insurance, including the role governments have played (Chapter 2), considers risk management options in Australia and local experience with different types of agricultural insurance products (Chapter 3), provides commentary on the current and potential types of insurance products (Chapter 4) and provides NRAC's discussion and findings (Chapter 5).

Before moving into the detail of the weather-related insurance schemes for agriculture it is useful to provide terms for and examples of the inherent risks associated with them. These terms are frequently used in this report (Table 1.1). A more expansive list is in the glossary.



**Table 1.1** Terms associated with agricultural insurance products

Term	Explanation	Example of inherent risks
<b>Asymmetric information</b>	Refers to the fact that farmers know more about their likelihood of obtaining alternative yields than do the insurers formulating the crop insurance policies. <sup>3</sup>  This can lead to adverse selection and moral hazard.	A farmer knows much more than insurers about the productivity of different paddocks and the influence different management practices will have on their yields.
<b>Adverse selection</b>	Refers to the fact that people who are more likely to suffer a loss will be more willing to insure at a given rate. <sup>4</sup>  As a result, insurers will raise premiums to cover costs and an increasingly high risk pool of farmers will purchase insurance. <sup>5</sup>	A farmer managing a business in a more drought-prone area will be more likely to purchase climate-related insurance. Alternatively, a farmer located in a safer rainfall region may not be inclined to pay for climate-related insurance.
<b>Moral hazard</b>	Refers to the fact that the insured person's optimal decision may change as a result of taking out insurance. <sup>6</sup>	A farmer may choose to apply less than optimal rates of fertiliser to a crop, in the knowledge that the risk of a yield loss is insured.
<b>Basis risk</b>	Refers to when payouts are imperfectly related to actual occurrences; payouts from an insurance product are imperfectly correlated with farmer yield.	With reference to area yield indexes, farmers may experience farm-level yield losses when area yield shortfalls are not sufficient to trigger a payment or vice versa. <sup>7</sup>
<b>Systemic risk</b>	Refers to a risk that affects a large number of economic units simultaneously. <sup>8</sup>  This risk provides limited opportunities for insurers to spread risk among a large range of clients. <sup>9</sup>	Widespread droughts may cause a large number of farmers to claim at once.  In addition to climatic risk, other systemic risks could include economy-wide shocks which affect agricultural producers such as exchange rates, energy prices and policy interventions. <sup>10</sup>

3 R Just & L Calvin 1994, *An Empirical Analysis of U.S. Participation in Crop Insurance*, Economics of Agricultural Crop Insurance: Theory and Evidence, Norwell, Massachusetts.

4 J Quiggin, G Karagiannis & J Stanton 1994, *Crop Insurance and Crop Production: An Empirical Study of Moral Hazard and Adverse Selection*, Economics of Agricultural Crop Insurance: Theory and Evidence, Norwell, Massachusetts.

5 Productivity Commission 2009, *Government Drought Support*, report no. 46, final inquiry report, Melbourne.

6 J Quiggin et al., op. cit.

7 J Skees, J Black & B Barnett 1997, 'Designing and Rating an Area Yield Crop Insurance Contract', *American Journal of Agricultural Economics*, vol. 79.

8 O Mahul & C Stutley 2010, *Government Support to Agricultural Insurance—Challenges and Options for Developing Countries*, The World Bank, Washington.

9 Productivity Commission 2009, *Government Drought Support*, Report No. 46, Final Inquiry Report, Melbourne.

10 T Kuethle et al. 2009, *Measuring systemic risk for crop and livestock producers*, Top Farmer Crop Workshop Newsletter.

The experience of other countries is useful when considering the feasibility and practicality of developing and implementing agricultural insurance in Australia, particularly as there is limited experience domestically with most types of such insurance. Beyond insurance for named perils (for example, hail and fire as well as frost for horticultural industries), Australian farmers have had little experience with agricultural insurance products. Therefore, the experiences other countries have had in implementing insurance are an important part of NRAC's consideration of what might be feasible and practical for Australian farmers.

## 2.1 History of agricultural insurance

Different forms of agricultural insurance have existed for centuries. In the 17th century farmers in Western Europe first started forming private mutual crop hail insurance companies and livestock insurance mutual companies. In the late 19th and early 20th centuries, private mutual crop hail insurance spread into the United States, Canada and Argentina. The 1900s saw the development of MPCl; one of the earliest examples being the United States' Federal Crop Insurance Program developed in the 1930s. Similar schemes started to develop in Latin America (for example, Brazil, Costa Rica, Ecuador and Mexico) and Asia (India and the Philippines) from the 1950s to the 1980s although most public sector programs in Latin America were terminated by 1990 because of their poor results.<sup>11</sup> In Australia, the first multiple peril crop insurance product was offered in 1974-75 by Wesfarmers and Western Underwriters. The product suffered from a lack of appropriate data, adverse selection and poor take-up by farmers and was consequently discontinued.

The use of index-based insurance, as distinct from traditional insurance products, is relatively new but has grown in recent years. The World Bank attributes this growth in part to the fact that such products address the systemic nature of agricultural production losses, such as widespread drought. Since the 1990s a number of products have been piloted around the world.<sup>12</sup> Index-based products in some countries have not moved beyond the pilot stage but other countries (for example, in Mexico and India) have well established programs.<sup>13</sup> Index-based insurance products are available in Australia; however, ABARES notes that these are generally uncommon in developed countries because of the domination of MPCl products.<sup>14</sup> Comparatively, NRAC notes that more than 15 index-based agricultural insurance programs have been implemented or improved since 2009 in low and middle-income countries.<sup>15</sup>

Use of agricultural insurance has increased over time. In 2008, it was estimated that around 50 per cent of all countries had some form of public and/or private agricultural insurance available.<sup>16</sup> Rapid growth in the value of global premiums is evidence of this expansion. For example, between 2005 and 2009 the total global value of premiums for agricultural insurance policies was estimated to have increased annually by 22 per cent.<sup>17</sup> The World Bank has attributed this growth to: increased commodity prices resulting in increased purchase of insurance policies; expansion of emerging markets in Brazil, China and Eastern Europe; and increased take-up resulting from government subsidisation of insurance in a number of countries, including Brazil, China, Republic of Korea, Turkey and the United States.<sup>18</sup>

<sup>11</sup> O Mahul & C Stutley, op. cit.

<sup>12</sup> ibid.

<sup>13</sup> M Hatt, E Heyhoe & L Whittle 2012, *Options for Insuring Australian Agriculture*, ABARES report to client prepared for the Department of Agriculture, Fisheries and Forestry, Canberra, September.

<sup>14</sup> ibid.

<sup>15</sup> O Mahul & C Stutley, op. cit.

<sup>16</sup> ibid.

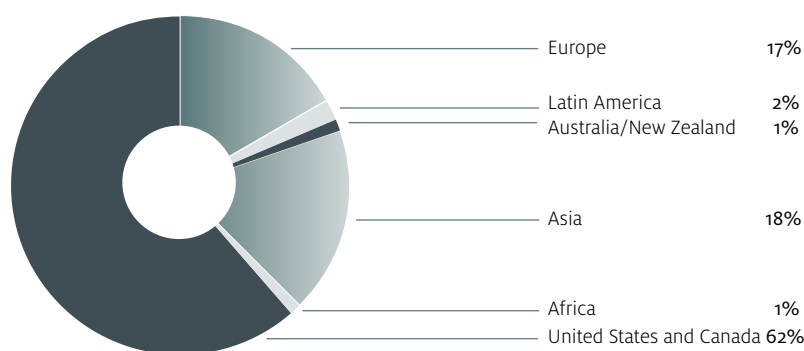
<sup>17</sup> Food and Agriculture Organization 2011, *Agricultural insurance in Asia and the Pacific region*, Food and Agriculture Organization (United Nations), Bangkok.

<sup>18</sup> O Mahul & C Stutley, op. cit.

## 2.2 International availability of agricultural insurance

The availability of agricultural insurance varies around the world, with approximately 80 per cent offered on a voluntary basis. Crop insurance accounts for almost 90 per cent of the value of global agricultural insurance policies—traditional named peril and MPCI insurance are the main two products offered.<sup>19</sup> Approximately 62 per cent of the value of global agricultural insurance policies is accounted for by policies in the United States and Canada (Figure 2.1).

**Figure 2.1** Percentage of global agricultural insurance premium value by region (2008)



Source: Adapted from R Iturrioz, 2009.

Available literature suggests that take-up of insurance is higher in more mature insurance markets, such as the United States, Canada and many European countries. Some of these markets have been operating since the 1900s. By comparison, countries that have developed or trialled schemes more recently (within the last five to 10 years) tend to have lower demand and take-up.<sup>20</sup> Given that the availability of underpinning farm production data (around 20 years' worth according to the Organisation for Economic Co-operation and Development (OECD<sup>21</sup>)) is a key element of an efficient insurance program, slower take-up and demand for newer products might be expected.

### Types of insurance and the different models used

A range of insurance products are available in different countries. These products broadly fall into two categories: 'traditional' insurance, such as named peril, multiple peril and mutual insurance products, and 'index-based' insurance, such as yield and weather index products. Traditional insurance products are designed to directly protect against yield losses on an individual farm. Index-based insurance uses indirect proxies (index) for yield losses on a farm, such as rainfall at a local weather station or shire-level yields.

Before conducting a more detailed analysis of how these two categories of insurance work (Chapter 4), and their possible application in Australia (Chapter 5), it is useful to briefly outline the main characteristics of each, their availability and, based on experience in other countries, the rationale for government involvement.

<sup>19</sup> O Mahul & C Stutley, op. cit.

<sup>20</sup> *ibid.*

<sup>21</sup> J Antón, S Kimura, J Lankoski & A Cattaneo, 2012, *A comparative study of risk management in agriculture under climate change*, OECD Food, Agriculture and Fisheries working papers, no. 58, OECD Publishing.

Table 2.1 Details traditional and index-based insurance schemes used around the world to manage weather-related production risk, the type of cover these schemes provide and in which countries they are available.

**Table 2.1** Insurance schemes used to manage weather-related production risks<sup>22,23</sup>

Insurance category	Insurance scheme	Type of cover provided	Schemes currently available in Australia	Available in (non-exhaustive list)
Traditional insurance	Named peril (single or multi risk) insurance	Single or multi risk—against one or more peril(s) of a non-systemic nature (usually hail, fire or frost).	Hail, fire and frost insurance available	Germany, Netherlands, United Kingdom, Ireland, United States, Portugal, New Zealand, Malaysia, India
	Yield or multi peril insurance	Comprises the main risks that affect yield (all named and combined perils plus, for example, drought). An example is MPCI.	None	Spain, Italy, France, Canada, United States, Japan, Republic of Korea, China
Index-based insurance	Index insurance (yield index and/or weather index)	Cover against a predetermined and/or modelled index (for example, yield or weather index).	New yield and weather index products have recently become available	India, United States, Canada, Mexico, Peru, Spain, Iran

There are three possible ‘models’ for agricultural insurance schemes. These are:

1. A scheme which relies entirely on involvement of private sector organisations.
2. A scheme that involves a partnership between private sector organisations and government.
3. A scheme provided entirely by government.

<sup>22</sup> M Bielza, C Conte, C Dittmann, J Gallego & J Stroblmair 2008, *Agricultural insurance systems*, European Commission, Italy.

<sup>23</sup> O Mahul & C Stutley, op. cit.



Table 2.2 describes each model and specifies some of the countries that have adopted them, noting that some countries use one or more of these.

**Table 2.2** Main insurance models used for agricultural insurance<sup>24,25</sup>

Model	Description	Available in (non-exhaustive list)
Private	Pure market-based agricultural insurance. Programs receive no financial or other support from government. Insurance and reinsurance is provided by general or specialist agricultural insurance companies.	Australia, New Zealand, Malaysia, Thailand, India, Germany, United States, Canada, Hungary, Sweden, Argentina, Netherlands
Public-private partnerships (PPP)	Responsibility for agricultural insurance delivery rests with a private commercial or mutual insurers and government commits support usually in the form of premium subsidies and/or reinsurance protection.	China, Japan, Mongolia, Republic of Korea, Pakistan, Spain, Turkey, United States, Canada, France, Brazil, Poland, Italy
Public	The government assumes full liability. This involves subsidisation and underwriting of insurance schemes.	Bangladesh, India, Nepal, Philippines, Sri Lanka, Canada, Greece, Iran, Cyprus

### Compulsory and voluntary insurance schemes

An important characteristic of the design of agricultural insurance schemes is whether they require compulsory participation rather than operating on a voluntary basis. NRAC notes that while the majority of insurance programs internationally are offered on a voluntary basis, some countries make it compulsory. Insurance can be made compulsory for: all farmers; for farmers producing specific agricultural commodities (for example, crop insurance in Japan is compulsory for farmers who produce wheat, barley and rice); or for farmers wishing to access agricultural loans (for example, in India and in the Philippines crop insurance is compulsory for farmers who borrow seasonal crop production credit).<sup>26</sup>

Compulsory agricultural insurance can mitigate the problem of adverse selection because low-risk farmers are forced to join the pool to balance the spread of the risk insured and reduce administration costs as those costs are spread across a large pool of insured farmers.<sup>27</sup> However, ABARES notes that such schemes will not address the underlying information asymmetry problems that result in distorted market price signals and incentives to farmers. The only way these problems can be resolved is if premiums are based on a farmer's individual risk profile. Otherwise, a compulsory scheme will simply cause a transfer of wealth between farmers, making the high-risk farmers better off at the cost of low-risk farmers.<sup>28</sup>

### Government involvement in agricultural insurance schemes

Governments are involved in agricultural insurance programs through public and PPP models. The rationale behind the involvement of governments in other countries, as cited in available literature, is market or regulatory impediments to the commercial development of insurance products. This has included:

<sup>24</sup> Food and Agriculture Organization, op. cit.

<sup>25</sup> O Mahul & C Stutley, op. cit.

<sup>26</sup> ibid.

<sup>27</sup> ibid.

<sup>28</sup> M Hatt et al., *Options for insuring Australian agriculture*.

- market failure—markets and products for agricultural insurance are poorly developed or unavailable<sup>29</sup>
- systemic risk—the nature of an agricultural risk, for example drought, to impact on a large number of farms can simultaneously create major losses for insurers which is beyond the capacity of private or pools of reinsurers to underwrite<sup>30,31</sup>
- limited availability of infrastructure to support agricultural insurance—the development of agricultural and weather databases and crop risk models provide agricultural insurers with reliable data and tools to assess risk exposure and provide insurance products based on accurate data<sup>32</sup>
- public policy for disaster assistance—ad hoc disaster payments can stifle the development of insurance products.<sup>33</sup>

### *Government subsidisation and underwriting of agricultural insurance schemes*

Premium subsidies are the most common form of government intervention in agricultural insurance—a 2008 World Bank survey found that 63 per cent of the 65 countries surveyed provided crop insurance premium subsidies.<sup>34</sup> Table 2.3 lists some of the countries that provide government-subsidised premiums for crop insurance, the percentage of subsidisation and the producer loss ratios experienced in each country. A producer loss ratio greater than 100 per cent means that, in the absence of government premium subsidies, these schemes would not be collecting enough revenue to cover insurance payouts.<sup>35</sup> Given all but four of the producer loss ratios in Table 2.3 are greater than 100 per cent, it is reasonable to conclude that insurance schemes are not often viable without government subsidisation.

**Table 2.3** Examples of average government subsidies for crop insurance, loss ratio, and producer loss ratio

Country	Average government subsidy (%)	Loss ratio (%)	Producer loss ratio (% for varying periods between 2003–07)
Brazil	34	81	123
Canada	52	74	186
Chile	53	45	95
India	6	314	336
Italy	61	57	147
Japan	51	90	184
Mexico	40	43	73
Philippines	49	73	142
Portugal	67	29	88
Republic of Korea	30	74	108
Spain	66	83	244
Sudan	53	34	72
United States	59	70	170

Source: Adapted from O Mahul & C Stutley, 2010.

<sup>29</sup> Food and Agriculture Organization, op. cit.

<sup>30</sup> O Mahul & C Stutley, op. cit.

<sup>31</sup> Food and Agriculture Organization, op. cit.

<sup>32</sup> O Mahul & C Stutley, op. cit.

<sup>33</sup> M Bielza et al., op. cit.

<sup>34</sup> O Mahul & C Stutley, op. cit.

<sup>35</sup> M Hatt et al., *Options for insuring Australian agriculture*.

Further, there is a correlation between the level of government support and the degree of take-up. For example, the United States and Canada have some of the highest levels of government-subsidised premiums and account for the largest percentage—62 per cent—of global agricultural premium value.<sup>36</sup>

NRAC has also observed in the literature that long-term government subsidisation of premiums can create an expectation of continued support and is likely to change farmers' decision making. For example, the availability of subsidised crop insurance may influence farmers to grow crops rather than livestock, irrespective of the suitability of land or market signals. It may also increase land values, as anecdotal evidence suggests is the case in the United States. The existence of these subsidies is likely to change the way farmers behave, potentially weakening their ability to independently deal with risk. If this becomes entrenched it may be difficult to reverse. For example, Canadian farmers have a very strong expectation that the government will bear at least part of the cost of agricultural risk, with a 1998 study showing that only 46 per cent of Canadian farmers accepted risk management as their own responsibility.<sup>37</sup>

#### *Government reinsurance of agricultural insurance schemes*

Reinsurance is insurance for insurers. Reinsurance is purchased by insurance companies to provide some protection from risks that they cannot or choose not to cover fully themselves—for example systemic risk. Reinsurance is provided through PPPs, public and private commercial avenues. Without reinsurance, insurers may not be able to meet demand for agricultural insurance or may be exposed to default risk.<sup>38</sup> For this reason, many governments provide reinsurance for agricultural insurance schemes either through the public or PPP model. The cost to governments for reinsurance is covered in more detail in Chapter 4.

<sup>36</sup> R Iturrioz, op. cit.

<sup>37</sup> J Antón, S Kimura & R Martini 2011, *Risk Management in Agriculture in Canada*, OECD Food, Agriculture and Fisheries working papers, no. 40, OECD Publishing, p. 14.

<sup>38</sup> O Mahul & C Stutley, op. cit.

## Chapter 3

# Risk in Australian agriculture

The need to manage risk is an inherent characteristic of agriculture and Australian farmers face a range of risks. Acknowledging this, Chapter 3 focuses on the main sources of risk—market and production risks. It considers these in the context of Australian agriculture and the different strategies farmers use to manage them. However, consistent with NRAC's terms of reference, the main focus is on production risk. The chapter also explores experiences to date in Australia with different types of agricultural insurance products and demand for these products.

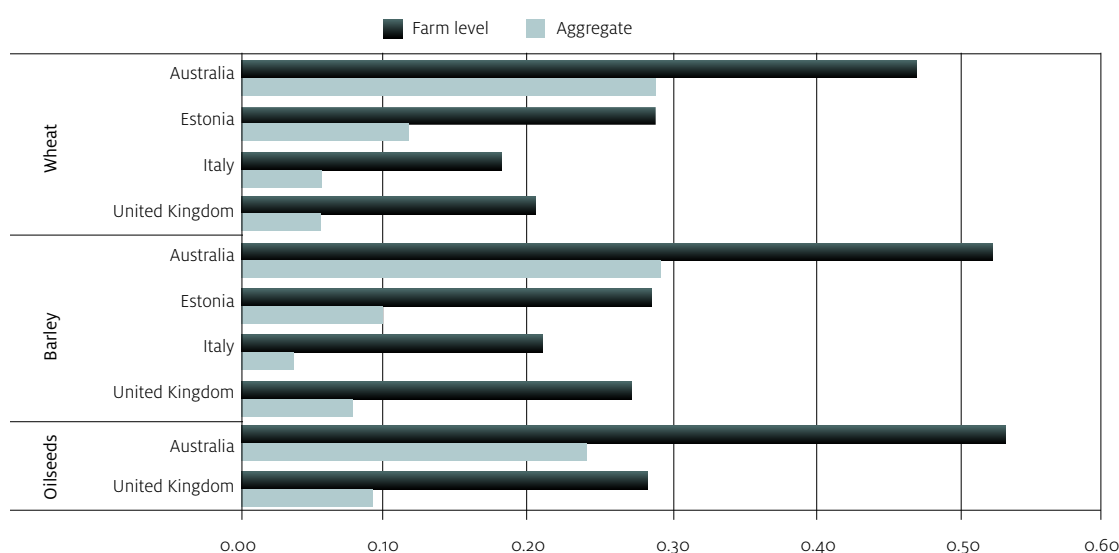
### 3.1 Market risk

Market risk stems from uncertainty associated with commodity prices, exchange rate fluctuations and access to international markets. Australia faces greater variability in commodity prices compared to other OECD countries because of its export focus (around 60 per cent of agricultural production is exported each year<sup>39</sup>) and the absence of government price supports to protect farmers from risk<sup>40</sup>. Consequently, Australian farmers are relatively exposed to market risk, in comparison with farmers in some countries. However, there is a range of risk management strategies available to Australian farmers to manage market risk which are listed in Section 3.3.

### 3.2 Production risk

Production risk arises from climatic variability, disease, pests and other factors influencing the level of production. Australian agriculture experiences greater production variability compared to other countries. Figure 3.1, for example, compares the variability of crop yields in Australia and three other OECD countries—Estonia, Italy and the United Kingdom.

**Figure 3.1** Variability in crop yields—Australia and other countries (based on historical time-series data 2001–07)



Source: S Kimura & J Antón, 2011.

39 DAFF 2012, Australia's agriculture, fisheries and forestry at a glance 2012, Canberra, May. CC BY 3.0.

40 S Kimura & J Antón 2011, *Risk Management in Agriculture in Australia*, OECD Food, Agriculture and Fisheries working papers, no. 39, OECD Publishing.

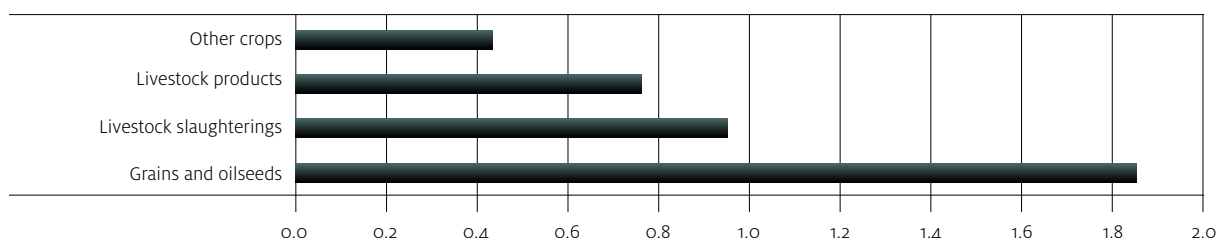


In addition to greater yield volatility, Australian agricultural industries are exposed to greater systemic production risks than are other countries (for example, European countries including Estonia, Italy, and the United Kingdom). This is risk that can be experienced by a large number of farmers and farm businesses at one time. This is because Australia suffers from more frequent and widespread catastrophic events, in particular drought, which affects farms in many different locations simultaneously.<sup>41</sup> The systemic nature of this risk influences how it is managed by farmers and farm businesses, industry, government and the commercial insurance sector.

Compared to other industries, Australian agriculture has greater volatility in production. According to ABARES, Australian farmers experience a higher degree of production risk than other sectors of the economy, and it is expected that this will further increase with a changing climate in important agricultural regions.<sup>42</sup>

Production variability is common to all agricultural industries in Australia; however the level of volatility differs across agricultural industries. In recent decades, for example, volatility in the value of production (which is strongly correlated to yields) for the grains and oilseeds sector has been much greater than that experienced by other industries.<sup>43</sup> Figure 3.2 demonstrates the high level of volatility in the grains and oilseeds industry compared to other crops and livestock.

**Figure 3.2** Volatility of the value of Australian farm production (index, agricultural industry average = 1.0)



Source: M Hatt et al., 2012. Note: The index values in Figure 3.1 and Figure 3.2 cannot be compared.

The differing levels of volatility between Australian agricultural industries suggest it is likely that demand for insurance products would also differ between them. Businesses that experience higher levels of risk, such as cropping enterprises, are likely to have a greater demand for insurance products than are those that experience relatively lower levels of risk, such as grazing enterprises.

### 3.3 Managing agricultural risk in Australia

NRAC acknowledges the range of strategies available to Australian farmers to manage market and production risk. There is considerable evidence that Australian farm businesses use these strategies to deal with a highly volatile operating environment. This is also done with relatively low levels of government support. For example, during one of the most severe and prolonged dry periods in Australia since 1900, nearly 70 per cent of Australian broadacre and dairy farmers in drought areas received no government drought support from 2002–03 to 2007–08.<sup>44</sup>

The range of strategies available are implemented at the discretion of farmers and influenced by the agricultural industry, the farming system and the geographic location of the farming business. Table 3.1 outlines some of the impacts of drought on agricultural industries and how different strategies can be adopted on farm to account for those specific risks. NRAC recognises that many more strategies are available.

<sup>41</sup> S Kimura & J Antón, op. cit.

<sup>42</sup> A Lock, M Hatt, E Mamun, J Xu, S Bruce, E Heyhoe, M Nicholson & K Ritman 2012, *Farm risk management in a changing climate*, ABARES conference paper 12.5, Canberra, March. CC BY 3.0.

<sup>43</sup> M Keogh 2012, 'Including risk in enterprise decisions in Australian's riskiest businesses', *Farm Policy Journal*—Autumn quarter, vol. 9, no. 1, Surry Hills.

<sup>44</sup> Productivity Commission, op. cit.

**Table 3.1** Impacts of drought on different agricultural industries and management strategies adopted on farm

Industry	Some impacts of drought	Farm-level management strategies
Broadacre grazing	Reduced pasture growth; consequent reduced meat and wool production	Destocking
		Supplementary feeding
	Reduced land carrying capacity	Containment paddocks
		Agistment
Dryland cropping	Quantity and timing of rain prior to and during the growing season influences yield	Variable use of inputs as season evolves
		Diversification of the farm business
		Change crop varieties and/or types, adjust planting dates, change fertiliser regimes
Irrigated cropping	Water allocation reduced or nil allocation depending on drought severity	Choose not to plant
		Temporary switch to dry land production
		Diversification of the farm business
Horticulture	Reduced to low water allocation	Allow some plants to die
		Pruning to minimise water use
Dairy farming	Reduced pasture growth	Increased supplementary feeding
	Heat stress	Animal shading, sprinklers

Source: Adapted from Productivity Commission 2009.

NRAC is aware of a number of government policies and programs that seek to assist Australian farm businesses to manage their risks, including:

- Farm Management Deposits which help farmers better manage the variability that can arise from market fluctuations and climate variability
- tax relief measures—for example, statutory effective life caps, income averaging and fuel rebates (also available to other sectors of the economy)
- decision support tools and climate forecasting—for example, Bureau of Meteorology services (Australian Government), The Long Paddock (Queensland) and monthly seasonal updates (Western Australia)
- training and farm business planning—for example, 'Plan, Prepare and Prosper' workshops for farm planning and management (Western Australia) and ProFarm courses (New South Wales)
- government grants that influence drought preparedness, including 'Caring for our Country', and the 'Carbon Farming Initiative'.

NRAC also acknowledges the range of commercial risk management strategies available to Australian farmers, including:

- price hedging, which can be used as a price risk management tool (using futures contracts, options and swaps in commodity markets to offset gains or losses made in physical markets or in foreign exchange markets to manage the risk of changing terms of trade)
- decision support tools—for example, GrassGro and Yield Prophet
- purchase of insurance (availability varies), primarily for named perils (hail and fire, and frost for horticultural industries)
- aspects of some general insurance products, such as drought clauses under livestock policies.

### 3.4 Agricultural insurance for weather-related production risks in Australia

NRAC notes the repeated calls from some agricultural industry groups for crop insurance products and for governments to be involved in their development and early establishment. In submissions to the economic assessment conducted by the Productivity Commission as part of the 2009 national review of drought policy the:

- Western Australian Farmers' Federation called for the review to again look at MPCI and for government to underwrite insurance schemes in the initial years.
- National Farmers' Federation recommended the government closely examine insurance options similar to those in place for Australia's major agricultural competitors. The federation justified government intervention as a means of overcoming market failure within the insurance sector, noting that farmers are currently largely unable to access insurance to underwrite the risks of climatic variability on agricultural production.
- New South Wales Farmers' Association considered a government underwritten crop-insurance type system would encourage farmers to adopt financial responsibilities for their long-term commercial viability, with sufficient scope to justify government intervention in this market failure.
- Queensland Farmers' Federation considered that more research is needed to progress MPCI, weather derivatives and yield index insurance options and that governments should consider underwriting support to deliver a public good at a lower cost than current drought assistance packages.

During consultations NRAC heard that a variety of views remain across national and state farming organisations on the feasibility of agricultural insurance in Australia and the appropriateness of government involvement in its development. However, there is general acknowledgement of the intricacies involved in developing a product that is effective and equitable, and the need for better information and data to support such products. NRAC notes the National Farmers' Federation's view that the Australian Government should continue consideration of a government-supported drought insurance scheme in Australia, not in isolation, but as part of broader drought policy reform.

Another argument put forward by some industry groups is for the development of agricultural insurance products to support the international competitiveness of Australian agriculture. The available literature indicates that, currently, many of Australia's agricultural competitors have access to generous and often heavily subsidised agricultural insurance schemes. NRAC has noted, for example, that United States and Canadian farmers have access to a wide range of government supported agricultural insurance products which represent 62 per cent of the value of agricultural insurance policies worldwide. While not directly comparable, Australia and New Zealand have very limited access to non-subsidised insurance products for production loss (representing 1 per cent of the value of policies globally).<sup>45</sup> Despite this, Australian farmers are among the most competitive in the world.

A number of studies have been conducted to investigate the feasibility of agricultural insurance products in Australia, specifically MPCI. Consistent findings from these studies include: the requirement for government subsidisation of premiums and reinsurance for MPCI; estimated take-up of insurance by farmers would be insufficient; the need for reliable data to underpin insurance and attract insurance and reinsurance companies' interest.

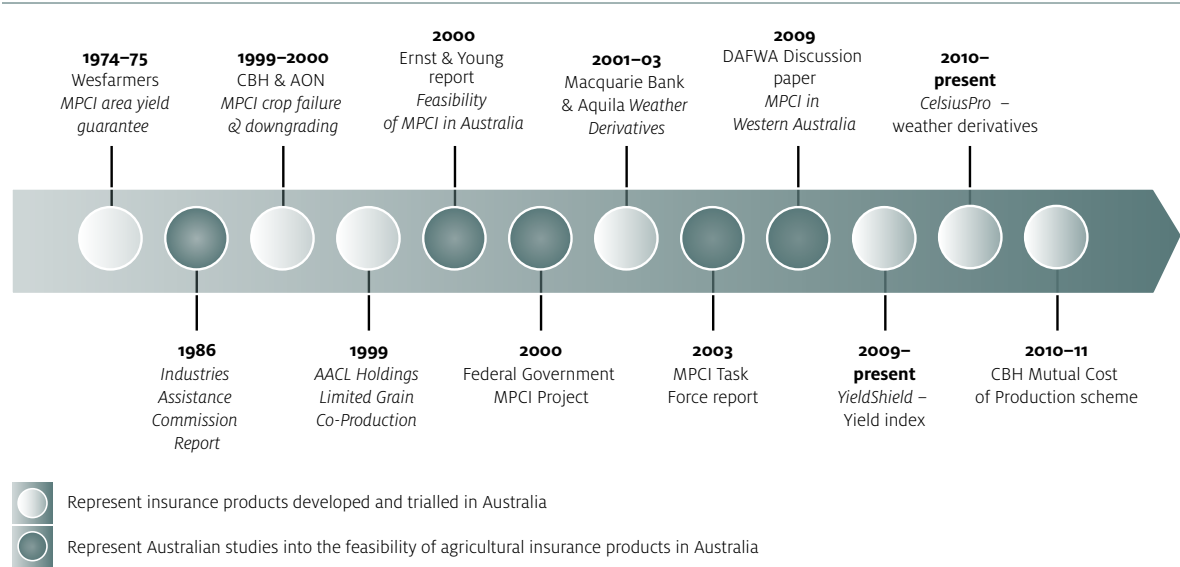
A number of weather-related insurance products have been developed and made available in Australia over past decades, focusing primarily on cereal cropping (mainly wheat). While index-based insurance products (YieldShield and CelsiusPro) are available in Australia, MPCI products trialled in Australia have had low take-up by farmers and have (consequently) been quickly withdrawn from the market. For example, the MPCI product offered by private companies CBH and AON in 1999 only resulted in 34 farmers taking out policies out of 1200 requested quotes. The scheme was only available for one year, in part, due to the low rate of quotation to policy take-up.<sup>46</sup>

<sup>45</sup> R Iturriz, op. cit.

<sup>46</sup> Department of Agriculture and Food Western Australia 2009, *Multi Peril Crop Insurance in Western Australia*, discussion paper prepared for the Minister for Agriculture and Food.

Figure 3.3 provides a timeline of the above-mentioned products and past studies. A more detailed description is included in Appendix 1.

**Figure 3.3** Timeline of agricultural insurance feasibility studies and products developed/trialled in Australia





As discussed in Chapter 3, insurance is one risk management option that can assist farmers to manage the financial impact of adverse weather on production. In this chapter NRAC examines in more depth traditional and index-based insurance products. The drivers of premium costs are examined and then related to the characteristics of Australian agriculture to assess the feasibility and practicality of different products. As outlined previously, given Australia's limited experience in agricultural insurance for weather-related production risks, NRAC's examination draws upon the literature, international experience and views heard during NRAC's consultations with stakeholders.

Before discussing insurance products in detail, it is important to understand how agricultural insurance costs are determined, since the premium (the cost of the insurance) is a key consideration for a farmer in deciding whether to purchase insurance. Take-up is an indicator of the level of demand for the insurance product, which ultimately determines if it will be commercially available and/or viable.

## Box 4.1 Calculating insurance cost

The estimated break even price of an insurance contract for the insurer is determined by three costs: risk costs; administration costs; and reinsurance costs.<sup>47, 48</sup>

### Risk costs

Risk costs are referred to as the 'actuarially fair' (or 'pure risk') premium and is equal to the value of claims that the farmer is likely to make over an extended period. This cost is calculated from historical production losses and the insurer's perception of whether these are likely to reflect future production patterns. Accounting for the possibility of extreme weather events may also be factored into these costs.

### Administration costs

Administration costs include the insurer's operating expenses, loss assessment costs and the information gathering and monitoring costs required to account for the existence of asymmetric information in agricultural insurance markets.

### Reinsurance costs

Reinsurance costs involve insurers transferring their risks to a reinsurance company by paying a premium. Without reinsurance the insurer is not able to 'trade' away systemic risk, for example widespread drought, and catastrophic risks. To determine the appropriate price for reinsurance premiums, underwriters employ experience- and exposure-based models, which rely on comprehensive and reliable data, such as long-term farmer crop yields and loss ratios.<sup>49, 50</sup>

With the estimated break even price calculated, the insurer may then add a profit margin to determine the premium price of the insurance product.

47 J Skees, B Barnett & B Collier 2008, Agricultural Insurance Background and Context for Climate Adaptation Discussions, GlobalAgRisk Inc.

48 M Hatt et al., *Options for insuring Australian agriculture*.

49 R Wehrhahn 2009, Introduction to Reinsurance, The World Bank, Washington DC.

50 P Baur & A Breutel-O'Donoghue 2004, *Understanding reinsurance*, Swiss Reinsurance Company, Zurich.

## 4.1 Traditional insurance products

Traditional insurance products are designed to directly protect against yield losses on an individual farm. The products discussed in this section are:

- named peril insurance
- MPCl
- mutual schemes.

As named peril insurance is not a focus of this report, NRAC has only briefly considered these products, noting that they are already widely used by Australian farmers.

### 4.1.1 Named peril insurance

As the name suggests, named peril insurance refers to an insurance policy that only provides coverage for the events named in the policy. It provides insurance against a limited number of adverse weather events, such as hail, fire and frost, which are explicitly listed. Private insurance markets for named perils are well developed because the insured events are less systemic in nature (that is, they tend to be localised) than are other climatic events<sup>51</sup> such as drought.

Crop insurance markets for hail, fire and frost are well established and there is a commercial and competitive market without government subsidisation. Australian farmers have been able to purchase commercial insurance for named perils, such as fire and hail (since 1918), for most crops. Some insurers also provide coverage for frost, primarily for horticultural crops. Australian crop farmers are familiar with named peril insurance but take-up rates vary considerably between crop types. A 2009 study by the Food and Agriculture Organization of agricultural insurance in the Asia and Pacific region found that, in Australia, broadacre crops (cereals, grain, legumes, oilseeds), industrial crops (cotton, sugar cane) and viticulture (wine, table and dried grapes) had high take-up with market penetration rates of 75, 44 and 41 per cent respectively. Conversely, insurance take-up for orchard crops (fruit, nuts, olives) and horticultural ground crops were very low—with market penetration rates of seven and zero per cent respectively. Named peril insurance is also available to livestock, forestry and aquaculture farmers; however, market penetration rates in these industries are generally much lower than the cropping sector.<sup>52</sup>

A key factor likely to account for the high level of take-up of named peril insurance for crops by Australian farmers is the relatively low premiums. During its consultations, NRAC was informed that cereal crop (for example, wheat, barley, oats) premiums generally range from 0.55 per cent of agreed crop value (nil excess) to 3.5 per cent (10 per cent excess) for hail, and about 0.1 per cent for fire.

As discussed in Chapter 2, traditional weather-related insurance products that provide coverage beyond named perils are not available in Australia. Two products that could provide such insurance coverage are MPCl and mutual schemes, both of which are discussed below.

### 4.1.2 Multi peril crop insurance

MPCl provides protection against yield losses from a wide range of perils that affect crop production. While the specifics of MPCl programs vary from country to country, the coverage provided to farmers under these policies is generally defined in terms of the farmer's expected crop yield.

MPCl policies normally insure farmers for 50 to 75 per cent of their expected yield. The expected yield is determined on the basis of the farmer's actual production history or the average expected yield for the area in which the farmer operates (for example, county). In the event that a claim is made against the policy, the amount of the payout is usually based on the extent to which the actual crop yield falls short of the guaranteed yield at the agreed commodity price<sup>53</sup> used for the purpose of the policy. Box 4.2 provides an example of the details of this type of policy using a case study which includes the outcome of the policy under three different yield scenarios.

<sup>51</sup> S Kimura & J Antón, op. cit.

<sup>52</sup> Food and Agriculture Organization, op. cit.

<sup>53</sup> R Iturrioz, op. cit.

**Box 4.2 Calculation of payout for yield-based MPCl****Insurance contract conditions**

Crop type	Wheat
Expected yield	3 t/ha
Guaranteed yield (GY)	2 t/ha
Future market price (FMP)	\$250/t
Insured unit area (IUA)	1000 ha
Sum insured:	\$500 000 (GY*FMP*IUA)

**Payout calculation**

If actual yield (AY) < GY: payout = (GY-AY)\*FMP\*IUA

**Scenarios**

a) Actual yield = 3 t/ha Payout = \$0.00 (3>2, no payout)	b) Actual yield = 1.5 t/ha Payout = \$125 000 ((2-1.5)*\$250*1000 ha)	c) Actual yield = 0 t/ha Payout = \$500 000 ((2-0)*\$250*1000 ha)
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The actual yield adjustment approach is attractive to both farmers and financial institutions as it can cover all causes of yield losses; however, because it protects against multiple perils, the risk cost for MPCl is high. Administration and reinsurance costs are also high and, as a result, most MPCl programs are not commercially viable without large premium and/or administrative subsidies paid by the government.<sup>54</sup>

The United States MPCl (US MPCl) program is one of the oldest and largest MPCl programs operating globally, so it provides useful insight into the level of government support required to provide affordable MPCl for crop farmers.

**Case study: The US MPCl program**

The US MPCl program operates under a PPP between the United States Government and 15 private agricultural insurance companies authorised by the United States Department of Agriculture Risk Management Agency (USDA RMA) to market MPCl policies. The USDA RMA sets the rates that can be charged and determines which crops can be insured in different parts of the country. The insurance companies service the program, including by writing the policies, marketing, adjusting and processing claims, training and keeping records. The insurance companies are obligated to sell insurance to every eligible farmer who requests it.<sup>55,56</sup>

Government support is provided by the USDA RMA in three ways—premium subsidies, administration subsidies and reinsurance. These are discussed below.

<sup>54</sup> J Skees et al., *Agricultural Insurance Background and Context for Climate Adaptation Discussions*.

<sup>55</sup> Crop Insurance America 2012, *About Crop Insurance—How it works*, [www.cropinsuranceinamerica.org/](http://www.cropinsuranceinamerica.org/), viewed in September 2012.

<sup>56</sup> United States Department of Agriculture Risk Management Authority 2012, *Crop Policies and Pilots*, [www.rma.usda.gov/policies/](http://www.rma.usda.gov/policies/), viewed in September 2012.

### Premium subsidies

The basic form of MPCI provides catastrophic yield coverage to 50 per cent of expected yield, and is provided to farmers at minimal cost (a small administrative fee is charged). Farmers can buy additional insurance, under a 'buy up' program designed to encourage the purchase of higher levels of coverage. Under this buy up program, the government subsidises a large portion of the premium to achieve targeted rates of participation.<sup>57</sup> The level of premium subsidy depends on the type of crop insured, with corn, soybean and wheat accounting for approximately 80 per cent of program policies. Subsidy levels range according to the coverage percentage: from a 67 per cent subsidy for 50 per cent coverage to a 38 per cent subsidy for 85 per cent coverage.<sup>58</sup> A table with examples of these arrangements is in Appendix 2.

Based on the coverage levels taken up by farmers, the average government premium subsidy across the program is 60 per cent.<sup>59</sup> Both parties pay their share of the premium direct to the insurance company: the farmer pays their share when coverage is taken up; the government pays its share of all farmer premiums taken up once per year. Between 2007 and 2011, government premium subsidies averaged US\$5.22 billion per year.<sup>60</sup>

### Administration subsidies

The government provides a 20 per cent cost reimbursement to insurance companies to offset their administrative and operation expenses. Reimbursements for these expenses are calculated as a percentage of policies written.<sup>61</sup> Between 2007 and 2011, administrative and operation reimbursements averaged US\$1.54 billion per year. Between 2007 and 2011, the USDA RMA incurred further program administrative and operation costs of more than US\$86.2 million per year.<sup>62</sup>

### Reinsurance

The US MPCI program is not commercially viable so the insurance companies involved cannot secure commercial reinsurance. Therefore the government underwrites the scheme. As the underwriter, the government is potentially liable for substantial sums of money during catastrophic and systemic weather events, such as widespread drought. For example, underwriting loss estimates for 2012 due to the current drought in the United States range from \$US10 to \$US14 billion.<sup>63</sup> The government has had an underwriting loss in two out of the last five years (2007 to 2011). In those years when loss claims are less than the premiums paid, the reinsurance component of the program makes a 'profit'; however, as previously discussed, 60 per cent of premiums are paid for by the government, and the total cost to government over the past five years has not been below US\$3.67 billion and has been as high as US\$11.29 billion.<sup>64</sup>

The significant level of government support provided makes MPCI affordable to most crop farmers in the United States—more than 80 per cent of insurable farmland in the United States is covered by the program.<sup>65</sup> Between 2007 and 2011, the average total government cost of the program was US\$6.34 billion per year.<sup>66</sup>

57 BJ Barnett, JR Black, Y Hu & J Skees 2005, 'Is Area Yield Insurance Competitive with Farm Yield Insurance?', *Journal of Agricultural and Resource Economics*, vol. 30(2).

58 United States Department of Agriculture Risk Management Authority 2012, RMA Premium Calculator, [www3.rma.usda.gov/apps/premcalc/index.cfm](http://www3.rma.usda.gov/apps/premcalc/index.cfm), viewed in September 2012.

59 BA Babcock 2009, 'Examining the Health of the US Crop Insurance Industry', *Iowa Ag Review*, vol. 15, no. 4.

60 United States Department of Agriculture Risk Management Authority 2012, *Fiscal year government cost of federal crop insurance*, [www.rma.usda.gov/aboutrma/budget/fycost2002-11.pdf](http://www.rma.usda.gov/aboutrma/budget/fycost2002-11.pdf), viewed in September 2012.

61 BA Babcock, op. cit.

62 United States Department of Agriculture Risk Management Authority, *Fiscal year government cost of federal crop insurance*.

63 J Blas 2012, 'Crop insurers cop record loss', *Australian Financial Review*, 28 August 2012, [www.afr.com](http://www.afr.com), viewed on 28 August 2012.

64 United States Department of Agriculture Risk Management Authority, *Fiscal year government cost of federal crop insurance*.

65 Crop Insurance America 2012, op. cit.

66 United States Department of Agriculture Risk Management Authority, *Fiscal year government cost of federal crop insurance*.

### 4.1.3 Mutual schemes

An alternative option for providing multiple peril crop insurance to farmers is mutual schemes, which are risk pooling schemes that provide insurance against any event and rely on broad participation; either voluntarily or through levies placed on production. These products can be categorised as ‘mutual insurance’ or ‘mutual fund’ schemes (the terms are frequently used interchangeably). Many of the advantages and disadvantages are common to both types of scheme. The major difference between the two is the type of contract that exists between the insurer and the policyholder. Mutual insurance includes a legal right to compensation while mutual funds do not.<sup>67</sup> For the purposes of this report, NRAC uses the generic term ‘mutual scheme’.

No such schemes currently operate in Australia. The most recent example of a mutual scheme that has been implemented in Australia is CBH Mutual’s Cost of Production Cover.

#### Case study: CBH Mutual’s Cost of Production Cover

The CBH Mutual scheme was developed by a working group comprising CBH, Willis Australia, Western Australian Farmers’ Federation, unspecified banks, Western Australia’s Department of Agriculture and Food, and PlanFarm Agricultural Consultancy.

Launched in March 2011 for the 2011–12 cropping season, the CBH Mutual scheme was a form of actual yield insurance available to wheat and barley farmers in Western Australia who were members of CBH Mutual. It was designed to help farmers manage risk by providing those who took out cover under the scheme with a payment if their actual value of production was below a pre-specified level, irrespective of the weather-related cause. The underwritten value of production was based on the size of the farmer’s intended planting area, historical average yield over the previous 10 years, a \$250 per tonne price for wheat and barley and their choice of cover level (30, 40, 50 or 60 per cent of expected revenue).<sup>68</sup>

If, due to adverse seasonal conditions such as drought, hail, frost or other natural perils, the actual value of production (as calculated under the terms of the policy) was below the underwritten value of production, the farmer could make a claim for the difference. The production trigger was a percentage of the farmer’s average yield multiplied by the area of wheat and/or barley sown. However, because the product was not based on a strict ‘insurance model’, payment of farmer claims was at the absolute discretion of the Trustee of the CBH Mutual Fund—Willis Australia. A worked example of how the product operated is available in Appendix 3.

According to ABARES, the CBH Mutual scheme was withdrawn after the 2011–12 cropping season primarily due to low levels of take-up. Premiums were also said to be too high because of a high probability of loss, costs associated with reinsurance and uncertainty of actual yield distributions. CBH indicated to ABARES that a lack of yearly yield data at shire level from independent sources such as the Australian Bureau of Statistics increased the difficulty in obtaining reinsurance.<sup>69</sup>

### 4.1.4 Estimated premium costs for an Australian multiple peril crop insurance scheme

One major reason for the low level of demand for previously trialled multiple peril crop insurance products in Australia is the high cost of premiums. As part of this report, NRAC asked ABARES to estimate the potential premium costs for an Australia-wide multiple peril crop insurance scheme. Based on regional yield data from 21 broadacre regions across the country, ABARES provided premium estimates for wheat, canola and lupin crops. NRAC notes that the ABARES analysis assumes that participation is compulsory and that there is sufficient regional (or shire) level data to accurately calculate premiums and secure reinsurance, the latter of which is currently not the case.

<sup>67</sup> M Bielza et al., op. cit.

<sup>68</sup> Willis 2011, *Product Disclosure Statement—Cost of Production Cover by CBH Mutual Fund*, Willis Australia Limited.

<sup>69</sup> M Hatt et al., *Options for insuring Australian agriculture*.



The concept of a compulsory insurance scheme introduced in Chapter 2 has been used in a number of countries throughout the world. NRAC acknowledges that assuming all farmers in Australia would participate in a multiple peril crop insurance scheme may not be realistic and notes that premiums would be higher under a voluntary scheme because of the adverse selection issues described earlier in this report.

ABARES has estimated insurance premiums to guarantee a crop yield equal to 25, 40 and 60 per cent of the long-term average regional crop yield in different parts of Australia (depending on choice of coverage). This is summarised in Table 4.1. The estimates assume a 60 per cent loss ratio and 30 per cent excess.<sup>70</sup> The loss ratio accounts for the cost of the premiums over and above the risk costs—the insurer’s administrative and reinsurance costs (Box 4.1). A 60 per cent loss ratio was used because ABARES considered it to represent the average loss ratios for MPCl schemes in high-income countries. The excess applies if the farmer makes a claim under the selected coverage option. The excess is a portion of the payout forgone that reduces the cost of the premium. A 30 per cent excess was used to be roughly comparable to excess rates under the US MPCl program where average excess rates are between 20 and 25 per cent.

Full details of this analysis, including premium estimates for canola and lupin crops, are in Appendix 4.

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<sup>70</sup> M Hatt et al., *Options for insuring Australian agriculture*.

**Table 4.1** ABARES estimated viable premiums for a compulsory multiple peril crop insurance scheme (MPCI or mutual scheme) for wheat in Australia—by region and coverage level (%)

Commodity	Wheat		
Coverage option of average regional yield (%)	25	40	60
	Premiums*		
New South Wales			
Far West	2.9	6.7	13.0
North West Slopes and Plains	2.1	4.8	9.1
Central West	2.6	5.4	^11.2
Riverina	2.7	5.0	9.9
Tablelands	1.4	4.6	8.4
Victoria			
Mallee	1.1	2.9	7.5
Wimmera	1.5	3.5	8.2
Central North	1.6	4.0	9.3
Southern and Eastern Victoria	0.8	2.9	7.4
Queensland			
Eastern Darling Downs	2.8	5.0	10.9
Darling Downs and Central Highlands	2.2	5.6	10.6
South Queensland Coastal—Curtis to Moreton	1.9	3.5	2.2
South Australia			
North pastoral	3.5	6.8	14.4
Eyre Peninsula	0.7	2.0	5.6
Murray Lands and Yorke Peninsula	0.8	1.9	5.6
South East	1.1	2.7	7.0
Western Australia			
Central and South Wheat Belt	0.1	0.6	^2.6
North and East Wheat Belt	0.6	1.5	4.6
South West Coastal	0.2	0.9	2.1
Tasmania			
Tasmania	1.4	2.9	6.7

□ ABARES wheat-sheep zone (as per ABARES farm level data collected from 1989 to 2011 )

\* Premium percentages are based on the regional yield value of the area insured

^ Box 4.3

Source: Adapted from M Hatt et al., 2012.

The wide variation in yield risk experienced across the Australian wheat farming industry would translate into large variations in premium costs projected under a compulsory Australian scheme (Table 4.1). For example, considering a 60 per cent coverage level (an insurance policy guaranteeing farmers will receive revenue equivalent to 60 per cent of the revenue that would have been received from a crop of 'normal' yield at an agreed wheat price per tonne) for the wheat-sheep regions in Australia, premiums range from 11.2 per cent (for the New South Wales Central West region) to 2.6 per cent (for the Western Australia Central and South Wheat Belt region) of agreed crop value. Box 4.3 provides a worked example of the application of this scheme to these two wheat-sheep regions.

**Box 4.3 Premium and potential payout calculations for two wheat-sheep zones****Insurance contract conditions**

Crop type	Wheat
Crop area	1000 ha
Regional yield	2 t/ha
Forecast wheat price	\$250/t
Coverage option <sup>^</sup>	60%
Sum insured	= 60% of regional yield value = 60%*(1000 ha*2t/ha*\$250) = \$300 000
Excess	30%

**Premium calculation—New South Wales Central West region**

= 11.2%\*regional yield value  
 = 11.2%\*(1000 ha\*2t/ha\*\$250)  
 = \$56 000 (premium cost = 26.7% of maximum payout)

**Premium calculation—Western Australia Central and South Wheat Belt region**

= 2.6%\*regional yield value  
 = 2.6%\*(1000 ha\*2t/ha\*\$250)  
 = \$13 000 (premium cost = 6.2% of maximum payout)

**Farmer payout scenarios**

Actual yield	Calculation (payout—excess)	Payout
≥ 1.2t	\$0	\$0
0.6t	\$150 000–\$45 000	\$105 000
0t	\$300 000–\$90 000	\$210 000

<sup>^</sup> A 60% coverage level means that 40% of the expected crop yield would need to be lost before the insurance cover applies.

The two worked examples show that even under the simulated ABARES compulsory scheme (that is, all wheat farmers in Australia participating), the cost of premiums would vary greatly across the country and some areas would be subject to much higher premiums than others for the same sum insured. NRAC notes that a compulsory scheme would raise additional issues, such as qualifying criteria (for example, farm size), ability to opt in or out (for example, number of hectares sown) and potential levy arrangements. NRAC has not attempted to address these as part of this report, but changes that move away from compulsory participation would result in higher premiums than those estimated in Box 4.3.

An alternative option to traditional products for insuring against multiple perils is index-based products, which are available to Australian farmers.

## 4.2 Index-based insurance products

In recent years, index-based products have been introduced, largely in developing countries that do not have subsidised traditional agricultural insurance schemes. India and Mexico have the most advanced schemes, and most other schemes have not yet developed beyond the pilot stage.<sup>71</sup>

The key feature of index-based insurance is that payouts are not determined by actual losses for an individual farm but rather on indirect proxies for yield losses such as rainfall at a local weather station or shire-level yields. The index may be a set of numbers representing a single variable such as rainfall or temperature over a given period of time (for example, a cropping season) or a more complex calculation involving many variables thought to have an impact on farm yields (for example, climatic data, historical yield data and other information).<sup>72</sup>

### 4.2.1 Types of index-based products

#### Yield index

Yield index insurance brings together a number of variables to predict crop yields using computer modelling. A yield index insurance contract could, for example, predict crop yield based on numerous climate related factors, as well as crop specific factors such as timing of planting, crop phenology (for example, the timing of flowering in relation to the climate) and crop management practices.<sup>73</sup> One yield index scheme (YieldShield) is known to be operating in Australia.

#### Area yield index

Area yield index insurance is based on regional level yields, so farmers would receive payments if average yields in their region fall below a pre-specified level, as opposed to receiving a payout for a fall in their individual yields.<sup>74</sup> The index is constructed by the insurer based on a guaranteed yield for the insured unit (area), normally in the range of 50 to 90 per cent of the expected yield. The insurer pays out if the actual yield of the insured crop in the insured unit falls below the guaranteed yield, irrespective of the actual yield of the policyholder. The payout is determined as the product of the shortfall in production in the insured unit and the sum insured. Payment is normally made six months after the crop is harvested.<sup>75</sup> No area yield index schemes currently operate in Australia.

#### Weather index

Weather index insurance products (also referred to as weather derivatives or weather certificates) are relatively simple products. They are based on an index representing a single variable which is highly correlated with production loss, such as rainfall or temperature (for example, rainfall events identified using the index that are so high or so low that they are expected to cause crop losses). Insurance policies (or weather certificates) specify an index (for example, rainfall), the insured period and where the index will be measured, the sum insured and any payout limits. If the rainfall is less than the index at the specified measurement point and over the period specified in the contract, the insurer will payout under the contract irrespective of the actual losses of the policyholder.<sup>76,77</sup> One weather index scheme (CelsiusPro Australia) is known to be operating in Australia.

<sup>71</sup> M Hatt et al., *Options for insuring Australian agriculture*.

<sup>72</sup> *ibid.*

<sup>73</sup> *ibid.*

<sup>74</sup> *ibid.*

<sup>75</sup> R Iturrioz, *op. cit.*

<sup>76</sup> *ibid.*

<sup>77</sup> Food and Agriculture Organization, *op. cit.*

## 4.2.2 Commercially-available index-based insurance products in Australia

### Yield index insurance—YieldShield<sup>78</sup>

YieldShield is a relatively new product offered by Primacy Underwriting Agency. The product combines traditional named peril insurance for hail and fire insurance with yield index insurance for insufficient or excessive rainfall for wheat and sorghum.

YieldShield's insurance attempts to overcome the lack of farm-level yield data by using the computerised crop simulation models to estimate crop yield. The models used are Oz-Wheat and Oz-Sorghum, developed by the Agricultural Production System Research Unit, a joint venture between the Queensland State Government and the Commonwealth Scientific and Industrial Research Organisation (CSIRO).

Oz-Wheat and Oz-Sorghum are agro-climatic wheat stress index models that integrate information on water deficit or surplus, historical climate data, and crop specific factors of broad crop phenology and crop management practices. Model outputs are generated at point scale then aggregated to create a shire-level index. The Oz-Wheat model runs from 1 October the year before sowing to account for the influence of the summer fallow on starting soil moisture conditions. The Oz-Sorghum model runs from 1 April the year before harvest.

The model input parameters for each shire—such as plant available water content, planting rain and stress index period—are selected based on the best fit when calibrated against actual shire wheat/sorghum yields from the Australian Bureau of Statistics from 1975 to 1999 for wheat and 1983 to 1987 for sorghum. During consultations, NRAC was advised that Primacy Underwriting Agency is looking into remote sensing as an option to improve accuracy at farm level.

A worked example of how this product operates to determine a claim for a wheat crop is in Box 4.4.

<sup>78</sup> M Hatt et al., *Options for insuring Australian agriculture*.



**Box 4.4 Calculations of payouts for yield-index insurance****Insured farm—farm and insurance specifics**

State	Western Australia
Shire	Quairading
Area of crop (wheat)	1000 ha
Value per hectare	\$480
Total sum insured	\$480 000
Start of Season (SOS) simulated yields	2.21 t/ha (June) and 2.01 t/ha (July)
Premium	\$29 760 (premium cost = 9.7% (June) and 10.1% (July) of maximum payout)
Excess	10%

**Final payout scenarios**

End of Season (EOS) simulated yield is 0.57 t/ha<sup>^</sup>

*a) Based on May forecast (issued in June)*

Water stress loss percentage	74.2%
Net loss percentage (74.2%–10%)	64.2%
Claim settlement	= 64.2%*\$480 000 = \$308 160

*b) Based on June forecast (issued in July)*

Water stress loss percentage	71.6%
Net loss percentage (71.6%–10%)	61.6%
Claim settlement	= 61.6%*\$480 000 = \$295 680

<sup>^</sup> Once the EOS is determined the method for calculating the loss is:

- If EOS < SOS then the water stress loss percentage = (SOS–EOS)/SOS.
- If EOS > SOS then there has been no simulated yield loss.

**Source:** Adapted from Primacy (no date), Crop insurance in Australia, discussion paper, Primacy Underwriting Agency Pty Ltd, Sydney.

## Weather index insurance—CelsiusPro<sup>79</sup>

CelsiusPro Australia (previously known as WeatherPro) is part of CelsiusPro AG, a Swiss company founded in 2008, specialising in structuring and originating weather derivatives. CelsiusPro AG also operates in Europe and North America, and provides products to the energy, construction, tourism, transport, retail and agriculture sectors.

The insurance products (weather certificates) offered by CelsiusPro are based on a weather index derived from measurements at official Bureau of Meteorology weather stations, using approximately 100 weather stations across Australia. A wide variety of weather certificates are available for agriculture, including:

- Rain Day certificate: Pays out a pre-defined amount for every day the daily rainfall is above farmer specified level
- Dry Day certificate: Pays out a pre-defined amount for every day the daily rainfall is below farmer specified level
- Frost Day certificate: Pays out a pre-defined amount for every day the daily minimum temperature is below farmer specified level
- Heat Day certificate: Pays out a pre-defined amount for every day the daily maximum temperature is above farmer specified level
- Dry Season certificate: Pays a pre-defined amount for every millimetre if the cumulative rainfall during a particular period is below farmer specified level
- Rain Season certificate: Pays a pre-defined amount for every millimetre if the cumulative rainfall during a particular period is above farmer specified level
- 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.

Worked examples of how this product operates under two different scenarios are in Box 4.5.

### Box 4.5 Calculations of premiums for rain day and dry season weather certificates for weather-index insurance

#### Scenarios

##### a) Rain day weather certificate

A farmer is concerned that their harvest is particularly sensitive to extended rain periods and that more than three days of rain can affect their crop yield. Desired protection is for \$50/t downgrade to their 5000t wheat crop; therefore \$250 000 to be covered.

#### Weather certificate

Period	15 November to 7 December
Locality (selected by the farmer)	Moree
Definition of rain day	A day on which >12 mm of rain falls at the weather station of the Locality, as provided by Bureau of Meteorology (Australia)
Payout per rain day	\$125 000
Maximum payout	\$250 000
Event	At least 3 rain days in the weather certificate period
Premium	\$21 556 (Premium cost = 8.6% of maximum payout)

Once the selected weather station (Moree) receives three days above 12 mm of rain, on the fourth day over 12 mm of rain (and for every subsequent day over 12 mm until the maximum payout is reached) the farmer will be entitled to received \$125 000. If there are not more than three days above 12 mm of rain during the cover period, the farmer does not receive a payout.

79 M Hatt et al., *Options for insuring Australian agriculture*.

#### Box 4.5 Calculations of premiums for rain day and dry season weather certificates for weather-index insurance continued

##### *b) Dry season (cumulative rain index) weather certificate*

A farmer is concerned that their wheat crop may not receive the critical rain it requires. The farmer believes that if more than 55 mm of rain is not received during the critical growing period it may affect crop yield. Desired protection is for cover of all input costs for 1100 ha sown to wheat at \$200/ha; therefore \$220 000 to be covered.

##### *Weather certificate*

Period	7 July to 15 September
Locality (selected by the farmer)	Moree
Definition of cumulative rain amount	<55 mm of rain falls at the weather station of the locality during the weather certificate period, as provided by Bureau of Meteorology (Australia)
Payout per mm not received	\$4000
Maximum payout	\$220 000
Premium	\$43 239 (Premium cost = 19.7% of maximum payout)
Rain received during the period is recorded as a total amount. If the total amount of rain is below 55 mm the farmer will receive \$4000 for every mm below 55 mm. If, say, 50 mm of rain falls the farmer will receive \$16 000. If more than 55 mm is received during the period of cover the farmer does not receive a payout.	

Farmers can purchase any number and/or combination of certificates.

**Source:** Adapted from Weather Pro 2012, Weather certificates—Product disclosure statement.

### 4.3 Issues of feasibility and practicality in Australia

As previously stated, the cost of premiums is a major factor understood to influence farmer take-up of insurance, which ultimately determines a product's commercial availability and/or viability. In considering the feasibility and practicality of traditional multiple peril crop insurance products and index-based insurance products, it is important to understand how the characteristics of these products influence the drivers of premium costs (risk costs, administration costs and reinsurance costs). These characteristics are described below.

#### **Risk costs (cost of the pure risk)**

From the insurer's perspective, estimating the 'pure risk' is the starting point for pricing premiums. For existing insurance products, historical loss cost (payouts divided by the sum insured) are used to estimate pure risk. For new insurance products, pure risk is estimated using available data to simulate expected loss cost. In either case, calculations are dependent on the availability of sufficient and high quality data.<sup>80</sup> During consultations, NRAC was advised that historical loss risk data for all cropping states in Australia is not available, so it is not possible to accurately calculate the risk costs for traditional multiple peril crop insurance products.

The cost of accounting for the possibility of extreme weather events would apply to both types of insurance. However, due to the volatility experienced in Australian agriculture, the premium loading for Australian agricultural insurance products is likely to be higher than it would be in many countries, and higher for products that cover grain and oilseed crops.

From a farmer's perspective, the pure risk component can also be thought of as the amount that would have to be put aside each year to self-insure (that is, saving in the good years to pay for the bad years).<sup>81</sup> During

<sup>80</sup> J Skees et al., *Agricultural Insurance Background and Context for Climate Adaptation Discussions*.

<sup>81</sup> M Hatt et al., *Options for insuring Australian agriculture*.

consultations, NRAC heard that Australian farmers do this in a number of ways including through savings, Farm Management Deposits, off-farm investments, maintaining high equity levels and additional borrowings.

## Administration costs

Administrative cost drivers include the information costs required to minimise asymmetric information, loss assessment costs and other operating expenses.

### *Minimising asymmetric information*

The cost of managing asymmetric information for traditional products can be significant for insurers because payouts are based on individual farm yields. Asymmetric information occurs because the farmer has more information than the insurer about risks faced and management practices used. To overcome this problem, insurers can collect the data required at their own expense or work out the cost of risk at a regional level and assume the rate is the same for all farmers of a particular crop type in that region.<sup>82</sup>

The cost of collecting the farm-level data needed to overcome asymmetric information (that is, historical farm yields, crop inputs and farmer management practices) is too expensive for private insurance companies to undertake. Currently, the comprehensive historical farm-level data required does not exist in Australia.<sup>83</sup> Independent farm production data is currently collected by the Australian Bureau of Statistics' Agricultural Census, and ABARES' Australian agricultural and grazing industries and Australian dairy industry surveys. However, the Agricultural Census is only undertaken every five years and participation in the ABARES surveys is voluntary (and data tends to be intermittent on an individual farm level), so these surveys cannot underpin potential multiple peril crop insurance products. Further, as discussed in Section 2.2, the OECD suggests that around 20 years' worth of data is required to underpin multiple peril crop insurance products.<sup>84</sup>

For index-based products, the level of asymmetric information is low because payouts are based on an objective measurement (that is, index) rather than individual farm yields. By basing the payout on an index, the farmer has no better information on regional level yield or weather than the insurer, and their management practices cannot affect the chance of a payout.<sup>85,86</sup> However, data availability is vital for index-based products. Weather index products require information from an adequate number of trustable weather stations<sup>87</sup> and yield index insurance requires time series and historical data. During the consultations, NRAC heard that if the granularity of current weather data available in Australia was improved, it would help reduce the level of basis risk for index-based insurance products.

### *Loss assessment*

Loss assessment can be costly and imprecise for traditional products. These costs are likely to be significant when assessing multiple claims simultaneously due to systemic weather events such as drought, or for large farms that are geographically dispersed.<sup>88,89</sup> Loss assessment costs are therefore likely to be high in Australia, adding to the overall administrative cost of these products.

For index-based products, there is no requirement for individual loss assessment for the insurer to make a payout since the payment is based on deviation from the index rather than on an individual's loss, so assessing claims is relatively quick and inexpensive.<sup>90,91</sup>

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82 M Hatt et al., *Options for insuring Australian agriculture*.

83 *ibid.*

84 J Antón et al., *op. cit.*

85 S Kimura & J Antón, *op. cit.*

86 Food and Agriculture Organization, *op. cit.*

87 S Kimura & J Antón, *op. cit.*

88 J Skees et al., *Agricultural Insurance Background and Context for Climate Adaptation Discussions*.

89 M Hatt et al., *Options for insuring Australian agriculture*.

90 S Kimura & J Antón, *op. cit.*

91 R Iturrioz, *op. cit.*

### Other operating expenses

Multiple peril crop insurance products require significant ongoing administrative commitment from the operators of these schemes. The US MPCl program provides some insight into the level of ongoing commitment required. Under the program, the USDA RMA alone employs approximately 500 staff across regional offices and has an administrative budget of approximately US\$80 million per year.<sup>92</sup>

By contrast, index-based products have relatively low ongoing administrative costs. However, NRAC's consultations revealed a low awareness and understanding of these products, so they may have higher marketing costs than do traditional insurance products.

From a farmer's perspective, administration and compliance requirements would be greater to access multiple peril crop insurance products than is currently required to use existing named peril insurance and index-based products. For example, multiple peril crop insurers may demand that farmers provide them with detailed production and yield data and restrict product take-up periods to try to limit the impacts of asymmetric information, moral hazard and adverse selection. Farmers would also need to ensure that they maintain accurate and comprehensive records, as these records could be audited as part of the loss assessment process for these products.

### Reinsurance costs

Reinsurance is not considered a constraint for index-based products<sup>93</sup> (due to the objective construction of the index<sup>94</sup>), but it has proven problematic for traditional multiple peril crop insurance. A key requirement for securing reinsurance, besides accounting for systemic risk issues, is independent, underpinning data. The most recently trialled multiple peril crop insurance product in Australia—the CBH Mutual scheme—highlighted a large data constraint to the provision of reinsurance for an Australia-wide multiple peril crop insurance scheme. CBH's dominant market position provided CBH Mutual with a unique record of historical grain yields for potential customers of its product<sup>95</sup>; however, even with this unique arrangement, CBH Mutual had difficulty obtaining reinsurance.<sup>96</sup> Independent verifiable data is required to validate the reinsurance contract and the comprehensive farm-level data needed does not exist in Australia.

### Product implementation issues for Australia

As discussed above, multiple peril crop insurance premiums are high because the inherent problems of asymmetric information, adverse selection, moral hazard and systemic risks associated with these products significantly impact on the drivers of premium costs. Additionally, ABARES estimates of premiums, based on a compulsory scheme and the existence of sufficient data, demonstrate the considerable variation between yield risks and therefore premium costs across Australia. Considering that premiums under a voluntary scheme would most likely be much higher than the ABARES' estimates, it is likely that a non-compulsory scheme would not be feasible in Australia unless it was heavily subsidised.

The only practical way to implement such a scheme in Australia would be with government support. Cost estimates of the level of support required have not been calculated as part of this report; however, the US MPCl case study (Section 4.1.2) provides some insight into the type and quantum of government support that may be required. Depending on the type of scheme introduced, equity in the provision of government support between agricultural industries would also need to be considered. For example, MPCl programs generally focus on cover for cropping enterprises, so other industries such as livestock and horticulture may be disadvantaged unless arrangements providing similar levels of support were also implemented for those industries.

92 United States Department of Agriculture Risk Management Authority 2010, About the Risk Management Agency, fact sheet, November 2010, [www.rma.usda.gov/pubs/rme/aboutrma.pdf](http://www.rma.usda.gov/pubs/rme/aboutrma.pdf), viewed in September 2012.

93 Food and Agriculture Organization, op. cit.

94 R Iturrioz, op. cit.

95 M Keogh, R Granger & S Middleton 2011, *Drought Pilot Review Panel: a review of the pilot of drought reform measures in Western Australia*, Canberra.

96 M Hatt et al., *Options for insuring Australian agriculture*.



Index-based products overcome many of the inherent problems associated with traditional multiple peril crop insurance products, so premiums are lower. However, these products have the problem of basis risk, which may reduce demand.<sup>97</sup> Careful design of the index insurance policy (that is, coverage period, trigger, measurement site) and localised and precise data, for example installation of weather stations, can help to reduce basis risk.<sup>98,99</sup> However, products that attempt to reduce basis risk by using additional data or complex modelling will have higher administrative costs.<sup>100</sup> The commercial availability of index-based products (Section 4.2.2) provides evidence that they are feasible in Australia. However, the high level of basis risk experienced by these products and their stage of development suggests that the practicality of them being commercially viable is not clear.

Table 4.2 summarises the qualitative factors affecting the feasibility and practicality of implementing traditional and index-based products in Australia. The table compares how the inherent risks associated with agricultural insurance schemes influence the price of and demand for these products. While the risk of asymmetric information, moral hazard and adverse selection are not problems for index-based insurance, data requirements and availability are impediments to product development and take-up.

**Table 4.2** Traditional and index-based product comparisons

Insurance category	Insurance type	Administration costs			Reinsurance costs	Farmer demand
		Asymmetric information	Moral hazard	Adverse selection	Systemic risk	Basis risk
Traditional	Named peril	Low	Low	Low	Low	Low
	MPCI—voluntary	High	Moderate	High	High	Low
	MPCI—compulsory	High	Moderate	Low	High	Low
	Mutual scheme—voluntary	High	Moderate	High	High	Low
	Mutual scheme—compulsory	High	Moderate	Low	High	Low
Index-based	Yield index	None	None	None	Low	Moderate
	Weather index	None	None	None	Low	High

Source: Adapted from M Hatt et al., 2012.

97 M Hatt et al., *Options for insuring Australian agriculture*.

98 M Bielza et al., op. cit.

99 Food and Agriculture Organization, op. cit.

100 M Hatt et al., *Options for insuring Australian agriculture*.

## Chapter 5

# Conclusions and findings

NRAC was asked to provide advice on the feasibility and practicality of implementing agricultural insurance products that could assist farmers in managing risks associated with weather-driven agricultural production downturns in Australia.

To inform its consideration of the matters covered by the terms of reference for this report, NRAC reviewed the available literature, met with key industry and government stakeholders to gauge their views, and sought advice from ABARES. This chapter discusses the issues NRAC considered pertinent to its assessment, and presents its conclusions and findings. Key findings relate to the risk management options available to Australian farmers, the feasibility and practicality of the traditional and index-based insurance products considered under the review, and the possible role governments could play.

### 5.1 Risk management options

Chapter 3 highlights the level of volatility faced by Australian farmers compared to other sectors of the economy, and the high level of volatility faced by Australian farmers when compared to many of their overseas counterparts. Australian farmers are recognised for their ability to manage the risks associated with this volatility and remain competitive without the levels of government support provided to some overseas competitors. The Australian and state and territory governments provide some services and tools to assist farmers in managing the risks inherent in the agriculture sector; however, there are periodic calls for assistance to be extended to the development of new insurance products.

NRAC heard a general view during its consultations that farmers have access to a wide range of market risk options (for example, swaps, futures, forwards, pools), and this range is continuing to grow. These appear to be competitive and well-functioning markets, and are expected to further develop and mature. NRAC notes, however that this does not mean that all farmers have access to a complete suite of market risk management options.

At the same time, consultations revealed that production risk management tools have not developed at the same pace as market risk tools. In the absence of insurance-based production risk management options that are commercially attractive, farmers have been innovative in using other risk management strategies, such as enterprise diversification, and seeking out productivity improvements on their farms. Farmers also use market risk management tools as an indirect way of managing the financial impact of adverse weather on production. An example of this is locking in favourable prices when a likely given yield is known.

NRAC notes that while market risk management tools cannot directly insure against weather-related impacts on production, they can play a role in the management of production risk. Consultations also revealed that generally farmers are using market risk management tools more as part of their overall risk management strategy, but that this is starting from a low (and unqualified) base.

**Finding 1a:** The risk management market for Australian agriculture has developed and evolved since previous reviews of MPCl conducted in 2000, 2003 and 2009.

**Finding 1b:** While insurance-based risk management products, such as multiple peril crop insurance, are not available in Australia, farmers have adopted a wide range of strategies to mitigate production risk. These include maintenance of comparatively high levels of business equity, securing off-farm income, diversifying enterprise mix, and using a wide range of technologies to maximise production efficiency and hence better manage risk.

## 5.2 Feasibility and practicality of insurance products considered

### Traditional products

Named peril insurance (for example, hail and fire) is commercially available to many Australian farmers and there is varying take-up of such products. This report does not attempt to analyse the role that such well-established insurance options play in Australian agriculture; however, when discussing and assessing the potential role of new insurance products, it is necessary to keep in mind that a range of products are already available.

During its consultations NRAC heard anecdotal evidence that farmers generally do not consider insurance to be 'value for money' when premiums exceed 10 to 15 per cent of the amount insured. Quantifying such a threshold was beyond the scope of this report and would be difficult because individual farmers have varying appetite, ability and options for managing risk. For example, NRAC is aware that if a premium for an existing product surpasses an individual farmer's threshold they will prefer to 'self-insure' (such as through savings, Farm Management Deposits, off-farm investments, maintaining high equity levels and additional borrowings). Farmers with a higher risk appetite tend to make no such provisions and just 'take a punt'.

NRAC also heard that in Australia there is a lack of adequate detailed production and weather data to underpin multiple peril crop insurance products—to the extent that some insurers commented it is not possible to even price a product. NRAC also suspects that the relatively high level of volatility (risk) and the high degree of systemic risk make it difficult to secure reinsurance, which also contributes to the lack of development of these products.

NRAC's consideration of international experience reinforces that traditional multiple peril crop insurance products are not commercially viable without government support. Where governments have provided support, they have done so (sometimes in combination) in a number of ways, including by: subsidising premiums, underwriting the costs of reinsurance, subsidising the scheme's administration and operating expenses, implementing detailed data collection systems to ensure data of sufficient granularity is available, and enforcing compulsory participation. NRAC concluded there is no evidence to suggest that this situation would be different in Australia and a multiple peril crop insurance scheme would require substantial government support over the long term.

Compulsory participation in multiple peril crop insurance schemes can reduce the cost of premiums as it removes adverse selection—an issue that drives premiums up. However, the ABARES analysis demonstrates that even under a compulsory multiple peril crop insurance scheme in Australia, the cost of premiums as a percentage of potential payouts would likely be very high for many regions. The levels of projected premiums would likely be too high to be considered value for money by many farmers, and NRAC heard there is little appetite among farmers for any form of compulsory insurance scheme in Australia even if this is what would be required to make it viable.

Premium projections by ABARES also assume there is sufficient regional or shire-level data to accurately calculate premiums and secure reinsurance, which is currently not the case. NRAC notes this would be perhaps a significant factor impacting on viability and cost. This was generally confirmed by insurers consulted by NRAC, with one major insurer suggesting that a minimum of five years data for all states in Australia of acceptable sample size would be required to establish an accurate pricing model.

### Index-based products

Compared to the traditional insurance products covered in this report, index-based products represent a relatively new and developing market, with limited products currently available in Australia.

In the case of a weather index (or weather derivative) the index may represent a single variable such as rainfall or temperature over a given period of time (for example, a cropping season). As detailed in Chapter 4, a yield index involves a more complex calculation of many variables (such as climatic data, historical yield data and other information) which impact on farm yields.

A key feature of index-based insurance is that payouts are not determined by actual losses on an individual farm. Rather they use indirect proxies (the index) to calculate yield losses on a farm (such as rainfall at a local weather station or shire-level yields). As a result the level of asymmetric information is much lower than for multiple peril crop insurance options, so administration costs are lower. This in turn means the private market can theoretically offer lower premiums and therefore these products have the potential to be more attractive to farmers.

However, by basing payouts on an objective measurement (the index) rather than individual farm yields these products encounter the problem of basis risk, which can work to reduce farmer demand. NRAC heard that market participants are working to reduce these impediments to achieve greater take-up.

While NRAC sees promise in these products to assist farmers manage their business risk, several additional factors have limited their take-up. Conceptually, both index-based products (yield and weather) are quite unfamiliar to many farmers and this was identified during consultations as a barrier to greater demand.

Given the uncertainty of the basis risk under a yield index, the actual risk experienced at farm level may differ from a modelled outcome. While it may therefore work well for some farmers, others may find it hard to see the benefit accruing to their farm business. Some farmers reportedly express concerns that the index does not accurately reflect the actual level of risk of their business, while the provider reported in consultations that many farmers underestimate their level of risk.

The weather index relies on a single (simple) event, which may make it difficult to apply these products on farm. Take-up of weather index insurance appears to be variable depending on the industry. For example, NRAC was advised that sugar cane and cotton growers have been more frequent users of these products, possibly because these growers have specific windows of time where adverse weather conditions can have a major impact on their crop yields and hence revenue. This reduces the range of days for which farmers would need a weather certificate and thereby reduces the premium to an acceptable level in these industries.

Notwithstanding these advantages over multiple peril crop insurance products for Australia, consultations revealed a relatively low level of awareness about these products among farmers and farm advisors. More reliable weather data, demonstrations of how the products work in different situations and efforts to foster better overall understanding of them by farmers may influence greater take-up. The review of the Western Australian Drought Pilot highlighted the benefits accruing to farm businesses from the whole of farm business training trialled under the pilot. It recommended that governments continue to support such training. NRAC considers that future provision of farm business training should incorporate risk management strategies for farmers, including the range of insurance products and how to make sense of them.

**Finding 2a:** Experience to date indicates that multiple peril crop insurance schemes, including MPCI and mutual schemes, are not currently commercially viable in Australia. It is unlikely they will be viable in the absence of a high and continuing level of government subsidies to cover premiums costs, administration and operating costs, and reinsurance costs. Notwithstanding changes in circumstance, NRAC's findings are consistent with previous reviews conducted in 2000, 2003 and 2009.

**Finding 2b:** Index-based insurance products (to manage variability in weather and yield) are commercially available and have some potential to assist Australian farmers to manage weather-related production risks.

### 5.3 Possible role for governments

NRAC heard a range of views on whether governments should become involved in subsidising multiple peril crop insurance schemes. Some groups were strongly of the view that subsidising was a role for government, including as a means of providing a level playing field for Australian farmers in comparison with their overseas competitors. Other groups felt just as strongly that governments should leave the market to operate without intervention. Three unintended, or secondary, consequences were also highlighted including:

1. the likelihood that a subsidised premium would be capitalised into land values, making cropping land more expensive
2. the potential for multiple peril crop insurance products to influence farm risk management behaviours such as enterprise mix and/or selection
3. some potential positive flow-on benefits to regional communities as a consequence of government subsidisation of insurance premiums.

The third consequence was raised anecdotally as an outcome of government subsidised MPCI schemes internationally. The MPCI scheme is considered to reduce the volatility of farm income, with resulting economic benefits for farm-dependent regional economies. This, in turn, is believed to result in more viable regional communities that are better able to maintain population levels and generate regional employment. It is not possible to accurately quantify this effect of an MPCI scheme.

It is beyond NRAC's terms of reference to comment on whether or not governments across Australia should support the development of multiple peril crop insurance products through subsidising one or more of the above costs; however, NRAC has been tasked with providing advice on what initial and ongoing government assistance would be required if such schemes were not otherwise commercially viable.

NRAC notes ABARES assessment that asymmetric information and systemic risk are significant problems that drive up the costs of private provision of insurance, and that these are possible sources of market failure in the operation of agricultural insurance markets. NRAC further notes that this does not necessarily lead to the conclusion that government intervention is warranted. Indeed, the overwhelming international evidence is that government intervention has not fixed these market problems and governments in a wide range of countries continue to be heavily involved in subsidising, underwriting and in fact running insurance schemes at great cost. A further test that must be applied is whether the benefits that farmers would experience as a result of government intervention and allocation of public funding would lead to an overall increase in the benefits accruing to society as a whole.

NRAC believes that given the greater variability in crop yields in Australia (Figure 3.1) compared to those of other countries, the relative costs of a scheme in Australia and the required levels of government support to make such a scheme viable would likely be higher than the costs experienced in other countries. Even if the cost and market impediments identified in this report could be overcome, implementing a MPCI scheme for one agricultural industry (for example, cropping) would, in NRAC's view, raise questions about the equity of this measure compared to measures available in other agricultural industries.

Consultations confirmed that access to independent and reliable information is a consistent issue across all products, which may affect product design, pricing, administration and the ability to obtain reinsurance. Some state government departments advised NRAC that they are investing in improvements to the provision of climatic information. For example, the Western Australia government is installing additional weather stations to support decision tools, and the New South Wales government is seeking to develop more holistic and publicly available climate information. However, NRAC notes that to date there is no coordinated development of best practice information collection in Australia. NRAC considers that there may be a role for government in enhancing the information needed to support decision making that may facilitate new and existing product development.



For example, granularity of data (which leads to basis risk) was reported to be one of the major impediments to greater take-up of index-based products.

NRAC considers there is a role for government to assist Australian agricultural industries become more self-sufficient and better at managing weather-related impacts on production through accessible and user friendly climate data.

Other ongoing roles for government include continuing to support partnerships with industry in rural research and development and extension, in particular in the areas of climate information and decision support tools, data provision and modelling, which will help farmers to better manage the risks they face.

**Finding 3a:** There is a role for government to assist Australian agriculture industries to become more self-sufficient and better at managing weather-related impacts on production through accessible and user friendly climate data. This may include providing enhancements and standardisation of existing data to foster greater use.

**Finding 3b:** A key challenge for industry and governments is to increase awareness of insurance options as part of a broader role in building capacity to manage risks. This could include ensuring that agricultural training programs include modules on the full range of farmer risk management options (including index-based insurance).

## Appendix 1: Chronology of agricultural insurance products and assessments in Australia

This appendix summarises previous assessments of agricultural insurance in Australia as well as products developed and trialled over time in Australia.

### Previous assessments of the feasibility of agricultural insurance products in Australia

#### *Industries Assistance Commission report (1986)<sup>101</sup>*

The Industries Assistance Commission was requested to assess whether the availability of crop and rainfall insurance to agricultural industries should be assisted in Australia and, if so, to what extent. The Commission's report noted little evidence to justify government subsidisation of crop and rainfall insurance. It also noted the high costs (establishment, administration, marketing and running costs) associated with agricultural insurance, the issues associated with insurance products (for example, moral hazard, adverse selection, systemic risk), as well as that the information required to set premium rates was not available or very expensive to obtain.

#### *Ernst & Young MPCl project (2000)<sup>102</sup>*

This project was funded by the Australian Government and state governments, some insurers, reinsurers and various farming and rural representative bodies. There were two phases.

The first phase found: there was basic grower demand for a multi peril product; government relief impacts on farmer participation in insurance; reinsurers were interested in supporting a properly constructed and delivered program but did not commit to their involvement; the degree of government support required to ensure viability was considerable. The second phase took further steps to determine whether MPCl could be introduced on a commercial basis in Australia and what degree of government support would be necessary to produce a product that was viable to farmers.

The second phase also conducted market research, which estimated an 18 per cent take-up rate, was considered to be well short of what would be considered viable by a number of stakeholders involved. Consequently, the results indicated a large gap that could only be filled by extensive government support. The resulting Ernst & Young report, based on some assumptions, estimated the costs associated with developing and running of a program, and what a government subsidy might look like.

#### *Federal Government MPCl project (2000)<sup>103</sup>*

This project looked at the feasibility of introducing a MPCl product for wheat and barley based on local government area yields. The project concluded that for a market to develop a MPCl product there was a need for government to be involved in subsidising premiums and providing reinsurance support for major catastrophes.

101 Multi Peril Crop Insurance Task Force 2003, *Report to the Minister for Agriculture, Fisheries and Forestry*, Western Australia.

102 Ernst & Young 2000, *Assessing the feasibility of establishing multi peril crop insurance in Australia*, Phase 2 report.

103 Multi Peril Crop Insurance Task Force, op. cit.

*MPCI Task Force (Western Australian government) (2003)<sup>104</sup>*

The primary objectives of the task force were to report on the feasibility of introducing commercial MPCI (for drought and frost) for wheat and barley crops in Western Australia, examine potential insurance schemes, examine demand for such schemes and investigate appropriate premiums.

The task force concluded that any commercially successful MPCI program would need to be backed by reliable data to appeal to insurance companies and reinsurers, and be attractive to farmers to gain sufficient take-up to meet start-up and administration costs. Threats to a viable program were flagged, including adverse selection, moral hazard, lack of farm-level data and high operating costs. The task force reported that farmer demand for unsubsidised premiums was very likely to be insufficient to attract commercial insurers. Finally the task force determined that the commercial insurance industry would not be interested in developing a commercial MPCI program in Western Australia in the near future. It determined that to develop, such a program would require significant government involvement by way of providing premium subsidies, underwriting risk and making the scheme compulsory to ensure farmer take-up.

*Department of Agriculture and Food discussion paper on MPCI in Western Australia<sup>105</sup>*

The purpose of this discussion paper was to review previous studies conducted by the Australian Government and Western Australian government (details of these studies are outlined above) to determine if circumstances have changed to a point where different conclusions could be drawn.

The discussion paper noted that variability had increased since the previous studies and, as a result, insurer's interest may have declined. Alternatively, increased variability may have increased grower interest. Irrespective, the need for government support by way of premium subsidies or underwriting was still considerable. Consequently the paper concluded that the development of a commercially driven scheme was less likely than what had been previously determined.

**Agricultural insurance products developed and trialled over time in Australia***Wesfarmers Scheme (1974–75)<sup>106</sup>*

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 from adverse selection, with farmers who never made 75 per cent of the yield average more inclined to take it on, while other farmers who rarely fell below this level had no incentive to do so.

*CBH and AON Scheme (1999–2000)<sup>107</sup>*

CBH and AON had a comprehensive product that offered—in addition to the traditional fire and hail cover—crop failure insurance and sprouting downgrading insurance to Western Australian grain growers. Crop failure insurance was provided for a nominated value per hectare, representing the cost of replanting the crop next season. Sprouting downgrade insurance provided cover for downgrading of grains resulting from pre-harvest sprouting caused by wet weather. Farmers were paid the difference in value between the intended grade of delivery and the grade eventually delivered.

The scheme used CBH's extensive grower records to develop actuarially fair premiums on an individual grower basis. Due to low demand and problems obtaining reinsurance backing for the scheme was only available for one year.

<sup>104</sup> Multi Peril Crop Insurance Task Force, op. cit.

<sup>105</sup> Department of Agriculture and Food Western Australia, op. cit.

<sup>106</sup> Multi Peril Crop Insurance Task Force, op. cit.

<sup>107</sup> *ibid.*

*Macquarie Bank and Aquila (2001–03)*<sup>108</sup>

Macquarie Bank, in association with the United States' firm Aquila and AXA in France, introduced weather derivatives to Australian farmers in 2001. The derivatives were based on rainfall and temperatures at weather stations across the country. Macquarie Bank stopped offering its weather derivatives products because of restructuring within Aquila.

*CBH and Willis (2010–12)*<sup>109</sup>

In 2011, a trial mutual scheme was introduced by CBH and Willis Australia to cover wheat and barley growers in Western Australia. The scheme—called Cost of Production Cover—essentially allowed participating growers to cover their production costs if their yield fell below pre-specified levels. The scheme was intended to cover growers against natural events, including drought, frost, hail, flood and fire risks. The scheme was withdrawn from the market after the 2011–2 growing season.

*AALC 's Grain Co-Production (1999–present)*<sup>110</sup>

AACL Holdings Limited has developed a product called Grain Co-Production, which has been operating in Western Australia since 1999. The product is designed to underwrite or insure farmer production costs against uninsurable risks such as drought, frost and flood.

Grain Co-Production works by attracting third party investors who provide unsecured capital to farmers each year to plant crops. The investors share the risks and rewards with the farmers. The model is an extension of the principal of share-farming.

The model provides farmers with a guaranteed amount of income on a contracted area of their farm each season. The majority of the payment to farmers is made at seeding time, underwriting their cash-flow regardless of the season. Should the contracted crops underperform or fail then the farmer does not suffer all the loss. Investor funds provide a form of income protection to the farmer by sharing the risk of growing the crop.

*YieldShield (2009–present)*<sup>111</sup>

YieldShield is a relatively new product offered by the Primacy Underwriting Agency. The product combines traditional named peril insurance for hail and fire insurance with a yield index insurance product to insure against insufficient or excessive rainfall, 'water stress', for wheat and sorghum.

*CelsiusPro (2010–present)*<sup>112</sup>

CelsiusPro Australia (previously known as WeatherPro) is part of CelsiusPro AG, a Swiss company, founded in 2008. It specialises in structuring and originating weather derivatives. Weather certificates are based on a weather index derived from measurements at official Bureau of Meteorology weather stations (using approximately 100 weather stations across Australia). A wide variety of certificates are available for agriculture.

<sup>108</sup> M Hatt et al., *Options for insuring Australian agriculture*.

<sup>109</sup> *ibid*.

<sup>110</sup> AACL Holdings Limited 2012, *Grain Co-Production*, [www.aacl.com.au/our-products/grain-co-production/](http://www.aacl.com.au/our-products/grain-co-production/), viewed on 8 August 2012.

<sup>111</sup> M Hatt et al., *Options for insuring Australian agriculture*.

<sup>112</sup> M Hatt et al., *Options for insuring Australian agriculture*.

## Appendix 2: US MPCl program premium subsidies

This appendix provides an example of US MPCl premium cost breakdown and premium liability from 2010.

Insurance contract conditions								
Insurance plan	Actual production history—based on farmer's actual yields							
Crop year	2010							
Crop type	Winter wheat							
Crop area	2471 acres (1000 ha)							
Crop yield	50 bu/acre (3.36 t/ha)							
Management practice	Continuous cropping, non-organic							
Price election	100%; US\$5.20/bu (US\$191/t)							
State/county	Montana/Custer							
<b>Coverage level (%)</b>	50	55	60	65	70	75	80	85
<b>Farmer payment (US\$)</b>	11 156	14 175	16 323	21 199	25 290	32 780	44 334	61 373
<b>Government subsidy (%)</b>	67	64	64	59	59	55	48	38
<b>Government payment (US\$)*</b>	22 651	25 201	29 019	30 507	36 393	40 065	40 924	37 616
<b>Total premium cost (US\$)</b>	33 807	39 376	45 342	51 706	61 683	72 845	85 258	98 989
<b>Premium liability (US\$)</b>	321 230	353 356	385 476	417 602	449 722	481 848	513 968	546 094

\* Note: Federal Government Payments do not include the 20% administrative and operation expenses reimbursement paid by the government to private insurance companies.

Source: Adapted from the United States Department of Agriculture Risk Management Authority 2012c.



## Appendix 3: How the CBH Mutual scheme operated—an example

This appendix provides an example of how the CBH Mutual scheme operated.

A farmer who is a member of CBH Mutual applies for the product by 30 April 2011 stating their intention to plant 10 000ha (4000ha wheat and 6000ha barley) in the shire of Perenjori for the 2011–12 season.

An Offer of Cover is provided to the farmer which based on their historical yields, will use historical yield averages of 1.5 t/ha for wheat and 1.7 t/ha for barley. The farmer accepts the Offer of Cover and submits payment of the Contribution by 20 May 2011.

- The farmer nominates selected Cover to commence at 50 % of average yield.
- The Cover Price of \$250 is used for the calculation of expected Value of Production.
- The Underwritten Value is \$2 025 000:
  - »  $4000\text{ha} \times 1.5\text{t} \times \$250 = \$1\,500\,000$  for wheat
  - »  $6000\text{ha} \times 1.7\text{t} \times \$250 = \$2\,550\,000$  for barley
  - \$4 050 000 expected revenue (total production)
  - »  $\$4\,050\,000 \text{ (total production)} \times 50\% \text{ of average yield} = \$2\,025\,000$  (underwritten value).
- The product may payout when the Value of Production of wheat and barley falls below \$2 025 000.
- The level of cover is: \$202.50 / Ha
  - »  $(\$2\,025\,000 / 10\,000\text{ha})$ .
- As a result of adverse seasonal conditions, total farm production harvested/yield is:
  - » 2200t wheat (4000ha @ 0.55 t/ha)
  - » 3000t barley (6000ha @ 0.50 t/ha).
- Value of Production (under the Cover) is calculated as: \$1 300 000
  - »  $2200\text{t} \times \$250/\text{t}$  (Cover Price) = \$550 000 for wheat
  - »  $3000\text{t} \times \$250/\text{t}$  (Cover Price) = \$750 000 for barley
  - Value of Production:  $\$550\,000 + \$750\,000 = \$1\,300\,000$ .

Therefore, maximum payout is \$725 000 (i.e. \$2 025 000 – \$1 300 000).

*Source:* Adapted from Willis, Product Disclosure Statement—Cost of Production Cover by CBH Mutual Fund.

## Appendix 4: ABARES estimated viable premiums for a compulsory multiple peril crop insurance scheme in Australia

Appendix 4 provides estimated viable premiums by region and coverage level, per cent of agreed crop value, 60 per cent loss ratio, and 30 per cent excess.

	Wheat (%)			Canola (%)			Lupins (%)		
	25	40	60	25	40	60	25	40	60
<b>New South Wales</b>									
Far West	2.9	6.7	13.0	na	na	na	na	na	na
North West Slopes and Plains	2.1	4.8	9.1	na	na	na	na	na	na
Central West	2.6	5.4	11.2	3.6	6.9	13.3	6.1	11.2	19.5
Riverina	2.7	5.0	9.9	4.7	7.2	13.3	3.6	7.5	16.5
Tablelands	1.4	4.6	8.4	na	na	na	na	na	na
<b>Victoria</b>									
Mallee	1.1	2.9	7.5	4.3	6.7	12.7	3.5	7.9	15.6
Wimmera	1.5	3.5	8.2	2.3	4.7	9.7	5.4	8.8	15.9
Central North	1.6	4.0	9.3	3.5	7.1	13.4	3.2	5.8	12.7
Southern and Eastern Victoria	0.8	2.9	7.4	1.8	6.1	11.6	3.7	6.7	13.2
<b>Queensland</b>									
Eastern Darling Downs	2.8	5.0	10.9	na	na	na	na	na	na
Darling Downs and Central Highlands	2.2	5.6	10.6	na	na	na	na	na	na
South Queensland Coastal—Curtis to Moreton	1.9	3.5	2.2	na	na	na	na	na	na
<b>South Australia</b>									
North pastoral	3.5	6.8	14.4	na	na	na	na	na	na
Eyre Peninsula	0.7	2.0	5.6	3.3	7.4	14.4	1.9	4.3	10.4
Murray Lands and Yorke Peninsula	0.8	1.9	5.6	0.9	3.5	9.1	3.0	5.5	12.0
South East	1.1	2.7	7.0	1.5	4.2	8.2	2.5	4.9	10.4
<b>Western Australia</b>									
Central and South Wheat Belt	0.1	0.6	2.6	0.9	2.6	6.1	0.8	2.7	6.0
North and East Wheat Belt	0.6	1.5	4.6	1.8	7.6	9.6	1.6	4.9	10.0
South West Coastal	0.2	0.9	2.1	0.1	0.5	1.9	0.1	0.7	3.9
<b>Tasmania</b>									
Tasmania	1.4	2.9	6.7	na	na	na	na	na	na

**Note:** na = not available. The premium rates are based on ABARES estimates for pure risk multiplied by 1/(loss ratio), and then by (1–excess).

**Source:** Adapted from M. Hatt et al., 2012.

## Appendix 5: Stakeholder consultations

Stakeholders	Located*	Meeting details		
		Date	Location	Face-to-face (F), teleconference (T) or written submission (W)
Agricultural Finance Forum (several members)	Australia wide	9 August 2012	Sydney	F
QBE Insurance Group	Sydney	9 August 2012	Sydney	F
Primacy Underwriting Agency (YieldShield)	Sydney	9 August 2012	Sydney	F
CelsiusPro	Sydney	9 August 2012	Sydney	F
Rabobank	Sydney	14 August 2012	Canberra	T
National Farmers' Federation Drought Working Group	Australia wide	14 August 2012	Canberra	F
Queensland Farmers Federation	Brisbane	14 August 2012	Canberra	T
Pastoralists and Graziers Association	Belmont	21 August 2012	Perth	F
Pascoe Partners	Perth	21 August 2012	Perth	F
Nuffield Australia 2011 scholarship winner	Bruce Rock	21 August 2012	Perth	F
Mingenew-Irwin Group	Mingenew/Irwin	21 August 2012	Perth	F
Farmanco Management Consultants	Mundaring	21 August 2012	Perth	F
Department of Agriculture and Food, Western Australia	Perth	22 August 2012	Perth	F
Dairy Australia	Melbourne	27 August 2012	Melbourne	F
GE Energy	Melbourne/Brisbane	27 August 2012	Melbourne	F
Australian Agribusiness Group	Melbourne	27 August 2012	Melbourne	F
Southern Quality Produce Co-operative Ltd	Ballarat	27 August 2012	Melbourne	F
Viterra (recently taken over by Glencore)	Adelaide	27 August 2012	Melbourne	F
WHK Accountants	Dalby, Inverell & Mildura	28 August 2012	—	T
NAU Country Insurance Company (recently acquired by QBE)	United States (various)	30 August 2012	—	T
Primary Industries Standing Committee High Level Group on Drought	Australia wide	31 August 2012	Canberra	T
Australian Government Department of Treasury	Canberra	31 August 2012	Canberra	F
Australian Taxation Office	Canberra	31 August 2012	Canberra	F
CGU Insurance	Melbourne	24 August 2012	—	W
National Farmers' Federation	Canberra	21 September 2012	—	W

\* Refers to head office location and/or office(s) where stakeholder representatives who consulted with NRAC are located.

## Guiding questions for NRAC's consultations on agricultural insurance products

Before the consultations stakeholders were provided with the following guiding questions to help them prepare for their discussions with NRAC.

1. What (if any) products are currently being used to cover weather-related agricultural production losses in your organisation/industry?
  - a. What is the level of use and awareness of these products?
  - b. What are the challenges and benefits of these products?
  - c. If none are available, why do you think these products are not available?
2. What existing product(s) are the most appropriate in assisting farm businesses to manage weather-related risks and why?
  - a. What factors seem most likely to affect the commercial viability of the product(s)? (for example, sufficient product demand, administrative and financial requirements, data availability, sufficient sector and geographical coverage)
  - b. Are you aware of any commercially viable international insurance products that would assist farm businesses to manage weather-related risks?
3. What level of demand is there for potential insurance products to cover weather-related agricultural production losses in your organisation/industry?
  - a. Who is driving this demand and for which particular products?
  - b. What specific risks do the products of interest to your organisation/industry cover? (for example, drought, flood, disease, wind)
  - c. Can you confirm the level of expected demand? (for example, surveys)
  - d. If there is nil demand why do you think this is so?
4. What do you see as the role for government in assisting the development and success of such products?
5. At what level are (or would be) premiums for existing or potential insurance products attractive to industry participants to manage weather-related production loss risk? (for example, would 15 per cent premiums be too high, or 5 per cent for 50 per cent risk reduction?)
6. The importance of farm business risk management and preparedness capabilities are becoming more important in Australia's changing climate.
  - a. Do you think that agricultural insurance products assist farmers to become better risk managers and more prepared?
  - b. If so, which products and how?
  - c. If no products currently available are suitable—what would you recommend?

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